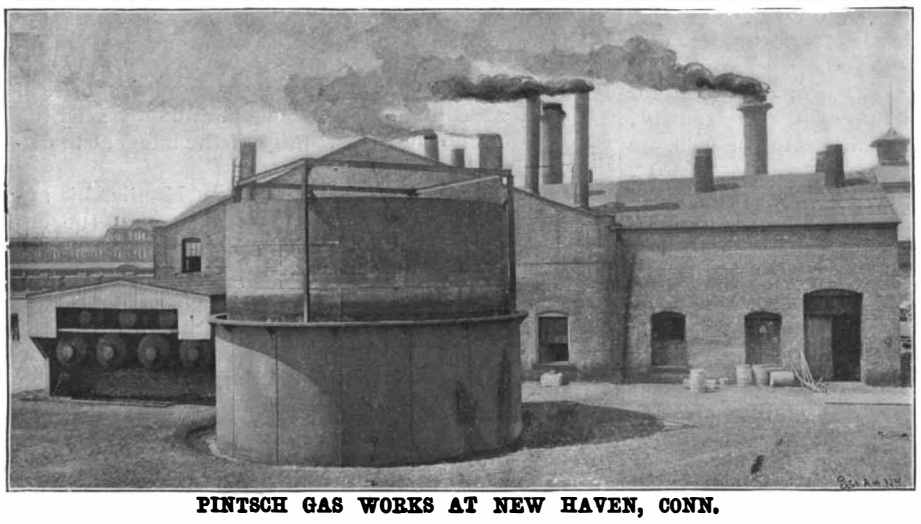
SCIENTIFIC AMERICAN

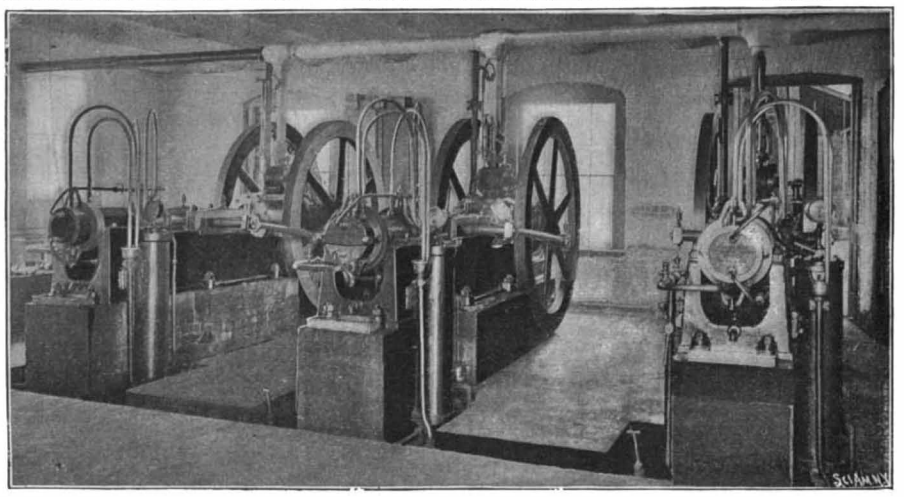
[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1898, by Munn & Co.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS CHEMISTRY, AND MANUFACTURES.

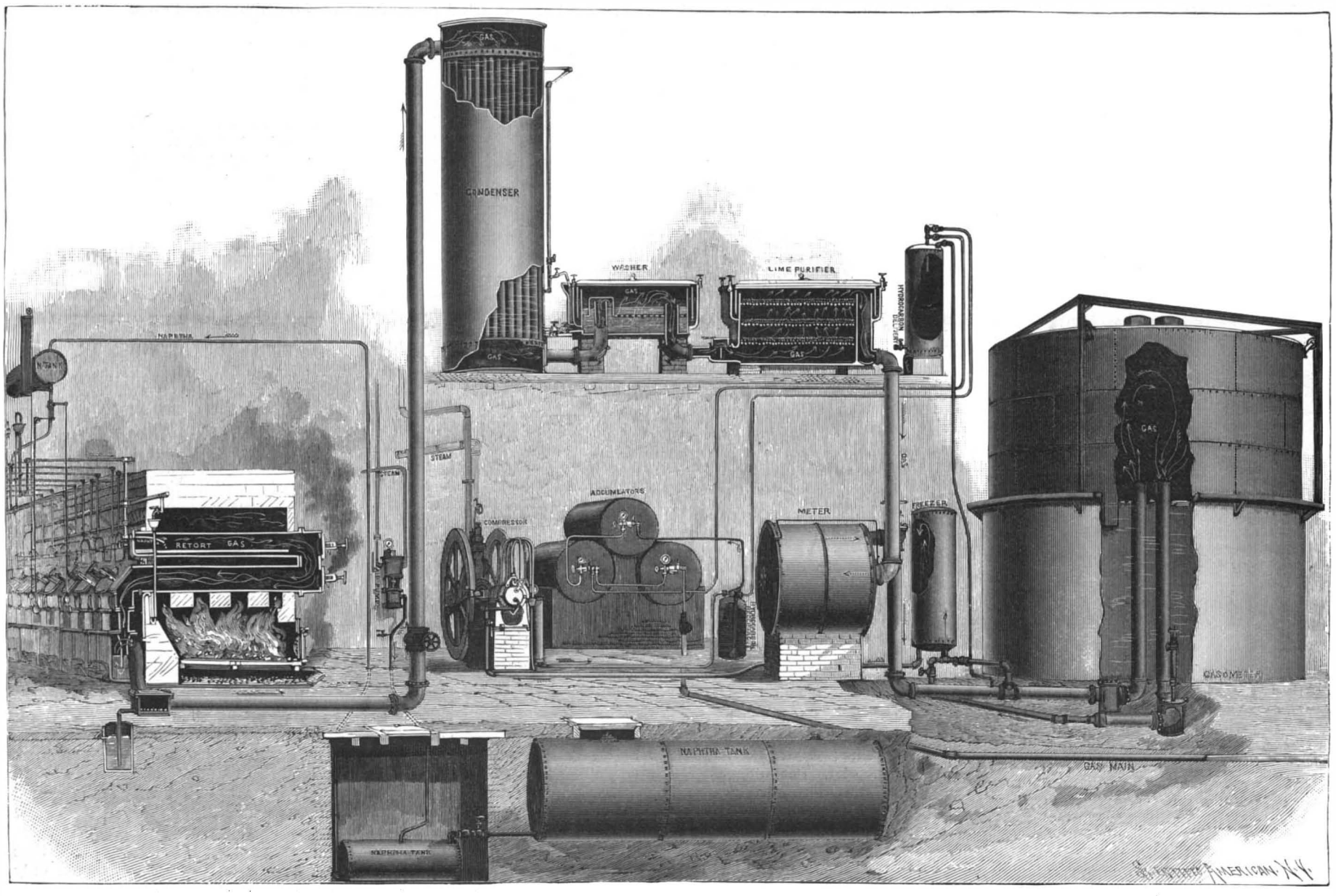
Vol. LXXIX.—No. 2. ESTABLISHED 1845. | NEW YORK, JULY 9, 1898. | $3.00 A YEAR. WEEKLY.



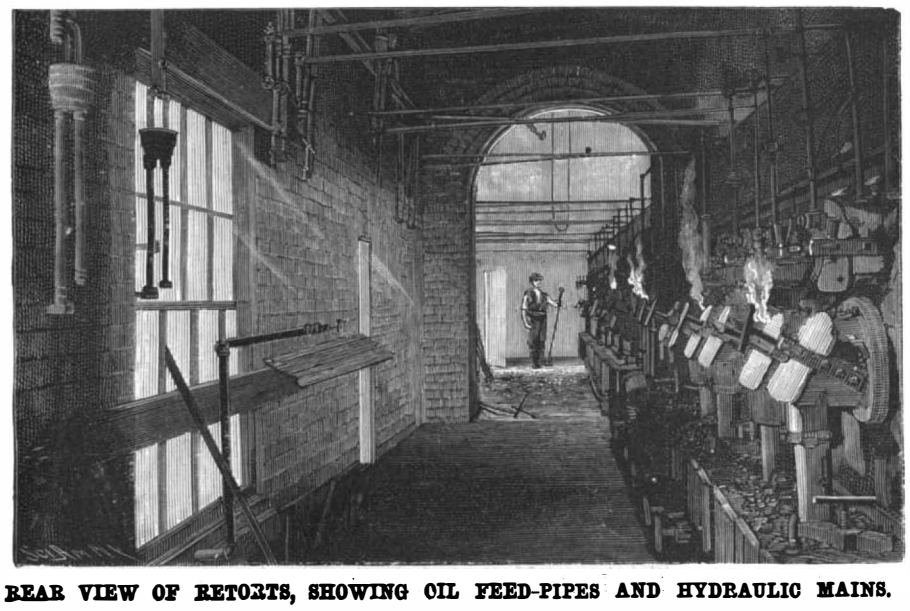
PINTSCH GAS WORKS AT NEW HAVEN, CONN.



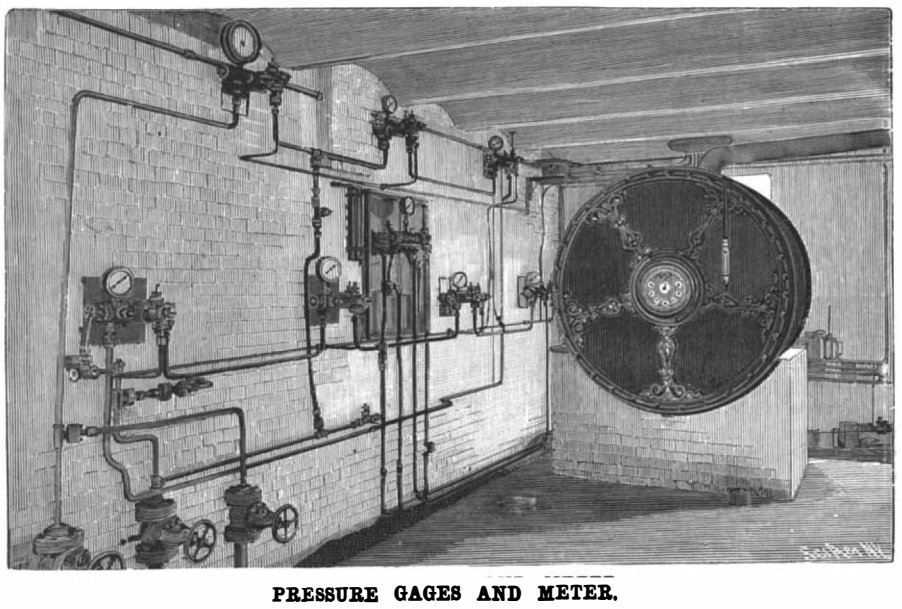
GAS COMPRESSORS.



ARRANGEMENT OF PINTSCH GAS PLANT.



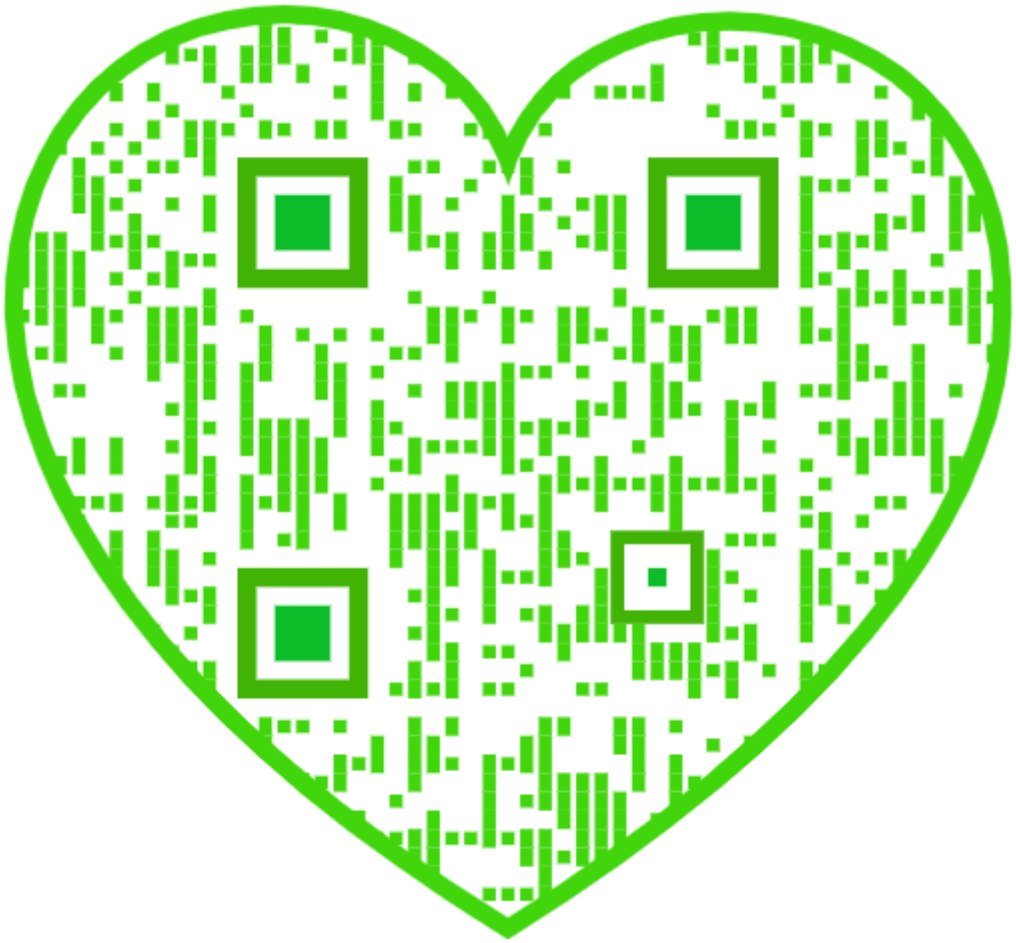
REAR VIEW OF RETORTS, SHOWING OIL FEED-PIPES AND HYDRAULIC MAINS.



PRESSURE GAGES AND METER.

A TYPICAL PINTSCH GASLIGHT PLANT.—[See page 27.]

© 1898 SCIENTIFIC AMERICAN, INC.



Scientific American.

ESTABLISHED 1845

MUNN & CO., - - - EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

TERMS FOR THE SCIENTIFIC AMERICAN.

(Established 1845.)

One copy, one year, for the U.S., Canada or Mexico.....$3.00
One copy, six months, for the U. S., Canada or Mexico..... 1.50
One copy, one year, to any foreign country, postage prepaid, £0 16s. 5d. 4.00

Remit by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, corner Franklin Street, New York.

The Scientific American Supplement
(Established 1876)

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year for the U. S., Canada or Mexico. $6.00 a year, or £1 4s. 8d., to foreign countries belonging to the Postal Union. Single copies 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to one address in U. S., Canada or Mexico, on receipt of *seven dollars*. To foreign countries, *eight dollars and fifty cents a year*, or £1 14s. 11d., postage prepaid.

Building Edition of Scientific American.
(Established 1885.)

THE BUILDING EDITION OF THE SCIENTIFIC AMERICAN is a large and splendidly illustrated periodical, issued monthly, containing floor plans and perspective views pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To architects, builders, and all who contemplate building this work is invaluable.

Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, $2.50 a year. To foreign countries, $3.00 a year, or £0 12s. 4d. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, to one address, $5.00 a year. To foreign countries, $6.50 a year, or £1 6s. 9d. Combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN, and SUPPLEMENT, $9.00 a year. To foreign countries, $11.00 a year, or £2 5s. 2d., postage prepaid.

Export Edition of the Scientific American
(Established 1878)

with which is incorporated "LA AMERICA CIENTIFICA E INDUSTRIAL," or Spanish edition of the SCIENTIFIC AMERICAN, published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number contains about 100 pages, profusely illustrated. It is the finest scientific industrial export paper published. It circulates throughout Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. THE SCIENTIFIC AMERICAN EXPORT EDITION has a large guaranteed circulation in all commercial places throughout the world. $3.00 a year, or £0 12s. 4d., postpaid to any part of the world. Single copies, 25 cents.

MUNN & CO., Publishers, 361 Broadway, New York.

☞ The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO.

☞ Readers are specially requested to notify the publishers in case of any failure, delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, JULY 9, 1898.

Contents.

(Illustrated articles are marked with an asterisk.)

Acetylene gas hazard, the..... 26
Army and coast defenses..... 18
Anæsthesia, local, electrically induced..... 20
Bicycles, an automatic steering head for*..... 20
Birds, a seminary for teaching singing..... 23
Boiler and furnace, a new steam*..... 20
Books, new..... 29
Bridge, Brooklyn, elevated trains on the..... 20
Cinchona from West Africa..... 24
Climate upon man and animals, the effects of change of..... 24
Corn, a rubber substitute from..... 24
Courage in modern warfare..... 15
Dewey squadron, reinforcement of the*..... 25
Education in Germany and America, technical..... 28
Gas light plant, a typical Pintsch*.....17, 27
Gate, an improved*..... 24
Genealogical search, how to make a..... 22
Geyser, gardening over a*..... 23
Honey, kussu..... 26
Indian names, war vessels..... 19
Inventions recently patented..... 28
Krypton..... 26
Metric system as applied to textile manufactures..... 22
Names, Indian, war vessels..... 19
Notes and queries..... 29
Petroleum in Maccabees..... 20
Pintsch gas, the manufacture of*.....17, 27
Preserving meat, a new way of..... 21
Quinine industry in Germany, the..... 26
Rubber man, Morris*..... 26
Science notes..... 22
Therapeutics, gastric juice..... 18
Tire, a novel pneumatic*..... 20
Typewriter and hearing, the..... 23
Warfare, modern, courage in..... 18
Wheels, trying..... 26
Wood-working machines, something new in*..... 21

OUR ARMY AND COAST DEFENSES.

In announcing, some few weeks ago, the publication of our SPECIAL NAVY SUPPLEMENT, we made the following statement: The great demand for information regarding our navy which has arisen from the present crisis has brought out the fact that, although excellent descriptions of the various ships have appeared from time to time, there is yet wanting a concise, accurate and fully illustrated compendium of the United States navy of the kind which the public is demanding.

The favorable reception of the NAVY SUPPLEMENT, as shown by an exceptionally large circulation and the number of congratulatory letters that reached this office, proved that we had detected and supplied another "long-felt want."

In the conviction that there is a similar demand for information regarding the equipment of our army, both for coast defense and operations in the field, we shall issue in a few days THE SCIENTIFIC AMERICAN ARMY AND COAST DEFENCE SUPPLEMENT.

Although in its scope and general "get up" it will follow the lines of its predecessor, the forthcoming special will be, if anything, a superior work, both in the high quality and number of its illustrations and the completeness and detail of the reading matter.

That the demand for such an issue exists is evidenced by the numerous queries that reach the editor's desk, asking for information as to guns, powder, armor, fortifications, submarine defenses and the thousand and one objects that may be classed under the head of war material. The questions relate to a subject with which the average layman has no means of becoming familiar, and while there is a vast amount of well-written information supplied from time to time by the daily press, it is necessarily fragmentary, and, for want of a general system in its presentation, apt to be confusing to the average reader.

In the forthcoming issue we have gathered together, from strictly official sources, the leading facts regarding the manufacture, operation and efficiency of the various weapons of offense and defense possessed by the United States. The opening chapter defines the true meaning of the term coast defense, and emphasizes the necessity for the co-operation of a powerful navy, if the system of defense is to be thoroughly efficient. Following this is an illustrated description of our heavy seacoast guns, their manufacture, carrying and penetrating powers, and method of mounting and firing. The rapid-fire gun is explained and the leading types in use in our service, from the 6-inch to the 6-pounder, are shown, with details of their mounting and breech-mechanism. Then follow the machine guns, with illustrations of the Maxim, Colt and Gatling weapons. There are chapters on projectiles and armor and a timely discussion of the properties and advantages of smokeless powder. The dynamite gun of Zalinski and the pneumatic gun of Sims-Dudley, both of which are doing good work in the present war, will be full of interest, and under the head of Harbor Defense will be found a series of articles on mortar-batteries, range-finders, torpedoes and submarine mines. The service rifles for our regulars, volunteers, and navy, are treated in an exhaustive article and the number closes with a lengthy chapter on the organization, etc., of the army. The issue makes its appearance at an opportune time, when the operations of our army in Cuba and the distant Philippines are at their most active and interesting stage.

COURAGE IN MODERN WARFARE.

The present war has served as a great upsetter of theories. Seagoing Spanish torpedo boat destroyers, that were to have wiped out our mosquito fleet and then proceeded to sink our battleships in detail, have proved helpless against our unarmored cruisers, and Spanish forts that were to have crumbled to dust at the attack of our 13-inch shells have persisted in holding up their heads with a stubborn endurance of which these mediæval heaps of stone and mortar were theoretically quite incapable.

Turning from the material to the personnel of modern warfare, we find that some pet theories will have to be renounced, if the earlier operations of the present struggle are a sure indication. Conspicuous among them is the oft-repeated statement that warfare has become such an exact science as to leave little room for the exercise of mere courage and daring, and that the moral and physical qualities which have carried the dominant races to their present commanding position will be largely discounted in all future conflicts. The dash and audacity which enabled the Anglo-Saxon to sweep the fleets of the Latin races from the seas at St. Vincent, Trafalgar, and the Nile, were to prove a snare and a delusion in these later days of the torpedo, the rapid-fire gun and the high-powered breech-loading rifle. War, at the close of the nineteenth century, was to be strictly scientific. The delicacy, complication and deadly accuracy of its modern instruments, the long range at which its operations would be carried out, the forethought and subtlety which are necessary in its tactics, would place the advantage of a latter-day conflict altogether with the races which had hitherto been obliged to bow to inevitable defeat.

The present conflict has proved that the theorists were altogether wrong—at least, so far as they discounted the value of the personal equation. Daring, dogged endurance, indomitable pluck, forehanded aggressiveness, self-possession in the critical moment—all the qualities, indeed, that went to make the ideal soldier in the days of the three-decker and the muzzle-loading rifle are as much a decisive factor now as then.

Though our war with Spain is but a few weeks old, it has been waged long enough to prove that under the changed conditions of modern warfare there is the same call for brave men and the same success awaiting their deeds. Manila, Cardenas, Cienfuegos, Santiago and Siboney bear eloquent witness to the fact that, peace-loving people that we are, the heroic qualities of the soldier lie dormant in the blood, and only need the call of duty and the opportunity of the moment to display their splendid force.

The swift descent of Dewey upon Manila, his audacious, but well considered dash through the entrance channels, his deliberate defiling to and fro before the combined fire of the fleet and shore batteries, undeterred by the explosion of two submarine mines directly in his path, the call of time by the American commander that his crew might breakfast before completing the rout of the enemy—all the thrilling incidents of that brilliant 1st of May are redolent of the spirit of Farragut, Decatur and Paul Jones, or of Drake, that naval hero of an earlier age, who, with unparalleled audacity, ran into Cadiz to "singe the beard" of the Spanish king.

Next in order of time, but equal in honor, was the rescue of our sorely beset little torpedo-boat "Winslow" by the unarmored craft "Hudson." It will be remembered that the Spanish gunners, who, for once, had got the range of our boats, were pouring a murderous fire into the "Winslow" when the "Hudson" steamed into the zone of fire, made fast a line and proceeded to tow the crippled torpedo boat out of range. The tow line parted and the "Hudson" backed in and made fast again with all the deliberation that would mark an ordinary landing at a friendly wharf.

Cienfuegos will be remembered for the cool nerve of our volunteer crews, who sat for hours in small boats, exposed to a galling fire, while engaged in the prosaic work of pulling up and cutting the telegraphic cables. Separated from their ships, with nothing of the enthusiasm of numbers to help them, these brave fellows, it seems to us, typify the very highest form of courage, and the readiness with which the volunteer list was filled shows that, whether duty calls at Manila or Cuba, our navy stands ready to answer.

But what shall we say of Santiago and the magnificent feat of Hobson and his associates? Death, which at Cienfuegos was a possibility, became here a certainty—for while it is true that provision was made for the rescue of the crew of the "Merrimac" after the ship was sunk, it is certain that no one expected to see a single soul return alive. This was self-sacrifice of the most absolute and unquestioned kind; a voluntary offering of eight young lives on the altar of their country's need—an offering for which there could be no possible expectation of a personal benefit to be reaped. In all ancient and modern history there may have been deeds which in heroic self-sacrifice have equaled this episode—but to have excelled it would have been, and forever will be, impossible.

We close with a brief reference to the latest exhibition of courage by our forces—this time on shore. The fight between the Spanish regulars and the volunteer troops, known as the "Rough Riders," was the first actual test of the fighting qualities of our "raw recruits;" and, as everyone knows, it proved that they are possessed of the pluck and staying qualities which win battles and snatch victory out of the very jaws of defeat. It must have been a remarkable sight to see that motley group of young Americans, gathered only a few weeks before from a dozen different walks in life, fresh from the pursuits of peace and pleasure, when suddenly confronted by as appalling a situation as ever tried the nerve of veteran troops, settling down to fight it out with as cool a nerve as if they were still upon the cattle range or the polo ground.

There is nothing more trying for troops than to be suddenly attacked by the withering fire of a hidden and inaccessible enemy. That they should have not only stood their ground, but driven the Spaniards from their strong position, is a feat the full significance of which is only apparent when we look at the list of dead and wounded.

Gastric Juice in Therapeutics.

A case of acute enteritis and one of cholera morbus were alike cured in a few hours by administration of fresh gastric juice taken from the stomach of a dog. The remedy was very effective in la grippe with gastro-intestinal complications, in gastro-intestinal dyspepsia and enlargement of the liver with progressive emaciation, in typhoid with severe emaciation, dilatation of stomach, and in deficient assimilation.—Fremont, Gazette Médicale de Paris.

© 1898 SCIENTIFIC AMERICAN, INC.

THE INDIAN NAMES OF OUR WAR VESSELS.

BY W. R. GERARD.

The present war, waged in its inception wholly by sea, has naturally brought into special prominence the naval branch of the service, and there are perhaps now few readers, especially among those who have possessed themselves of a copy of the NAVY SUPPLEMENT of the SCIENTIFIC AMERICAN, who are not well acquainted with the composition of our navy, or familiar with the names borne by its various vessels, from battleships down to armed tugs and dispatch boats. Concerning the origin and application of many such names, however, there is doubtless not so much known; and this is especially the case with regard to those of Indian derivation, some of which have never been interpreted, while the meaning ascribed to others, in books, has in many instances been drawn from the imagination of those who have preferred to indulge in guesswork rather than endeavor to ascertain facts.

One of the results of the war has been to bring to the front for the purpose of harbor defense some of the old monitors, of which the construction was authorized in 1862. Among these relics of the past, there is one called "Canonicus," which perpetuates the memory of the "Great Sachem" of the Narragansetts, whose name otherwise, and more correctly, spelled Qunonacus, means "He is of tall aspect." This famous sachem's nephew, Mekumeh, "Put me in mind," who in youth was his marshal, afterward his associate, and finally the principal sachem of the Narragansett country, was always the warm friend and protector of the settlers of Rhode Island. He is described by his contemporaries as having been a man of great stature (a family characteristic, as would appear from his uncle's name), haughty, stern and commanding, and one who caused all his subjects to tremble at his speech and promptly to respond to his summons. It was doubtless for this reason that in mature years he received the name by which he is best known in history—that of Maĭantonomeu (My-an-ton-óm-ai-oo), meaning "He gathers together by word of mouth." His name has been variously spelled in historical works, and, in the form of Miantonomoh, is now borne by one of our modern monitors. The name of the Mohegan sachem who defeated Maĭantonomeu in battle, delivered him to the English, and afterward superintended his execution, is borne by the dispatch boat "Uncas." Uncas is a corruption of Wankus, an Algonkin name for the fox; the word means "the circler," and refers to the animal's habit of doubling or circling when pursued.

Another of the old monitors is the "Manhattan," named after our own island, which in turn was so called by the Dutch after its aboriginal owners, the Manahatenak, or "Island Highlanders," whose favorite place of resort and residence was, as their name implies, the upper half of the island, where deer, beaver, otter, etc., were found in great abundance, and where the rich bottom lands subsequently known as the "Harlem Flats" were available for tilling and planting.

The monitor "Montauk" bears the name of a point familiar to everyone as the locality off which the waters of the ocean meet those of Long Island Sound. Montauk is a nasalized form (dating from about the middle of the seventeenth century) of a word that was originally spelled Matowack or Metowack—properly, Metawak—the participial form of Matawan, meaning "where one body of water enters another," i. e., place of confluence.

In the name of the monitor "Passaic," so called either from a city or a river of New Jersey, we have the Lenape word for "valley."

The "Mahopac" was named after a well-known watering place in Putnam County, N. Y. The older spelling of the word—Macookpack—stands for the Lenape Mechekpog, meaning "large lake."

The "Nahant" was so called after a watering place situated on a small rocky peninsula in Massachusetts Bay and the Indian name of which means "at the promontory." In "Nantucket" (the name of another of the monitors) we have a word from the same root as the last mentioned, meaning "at the promontory in a tidal river."

The name of the monitor "Lehigh" is a corruption of Lechau, a word abbreviated by the Moravian missionaries in Pennsylvania from the Lenape Lechauhanne, meaning the "fork of a stream." The familiar river name Lackawanna represents the unabbreviated word.

The "Wyandotte" bears the name of an Iroquoian people whom the French nicknamed the Hurons. Their name apparently meant, in its original form, "the Islanders."

Finally, in the name "Comanche," meaning "separated," or "estranged," we have the appellation of an aboriginal people of Numa stock, who formerly wandered through northern Texas and on both sides of the Rio Grande.

Of the new monitors, the only one besides the "Miantonomoh" that bears an Indian title is the "Monadnock," which was so called after an isolated mountain in Cheshire County, N. H. The aboriginal name of this eminence was Manadene, the "bad mountain," which, with the locative suffix, becomes Manadnak, "at the bad mountain." The name was probably given from the fact that a storm is preceded for several hours by a roaring of the mountain (of evil portent to the natives), which, according to Jeremy Belknap, may be heard to a distance of ten or twelve miles.

It is probably to a tradition that the Indians regarded this eminence as "manito," that is, as possessing something of the supernatural or mysterious, that is due the unwarranted interpretation, "the spirit's place," found in some books. As the letter n is convertible in Algonkin with l and r, the derogatory prefix in this word becomes in certain dialects mal or mar; whence the name Maramak, a "bad fishing place," applied to some locality upon a New England river, to which the appellation, in the corrupt form of Merimack or Merrimack, was early transferred by the European settlers.

As well known, the name of this river was formerly borne by a United States frigate, which, under the name of "Virginia" (by which she had been rechristened by the Confederates), had a memorable conflict with Ericsson's "Monitor" in Hampton Roads, March 9, 1861. Her successor in name now blocks the entrance to the harbor of Santiago.

Two other of our war vessels bear the name of mountains. One of these, the armored ram "Katahdin," was so called after the highest elevation in Maine, the Indian name of which, Ketádene, means the "principal mountain." The other is the battleship "Kearsage" (now constructing), which is to perpetuate the memory of the famous corvette that sank the Confederate cruiser "Alabama" in 1864, and ended her career on Roncador Reef in 1894. This vessel was so called after a conspicuous eminence in Carroll County, N. H., the modern name of which is a very bad corruption of Kowasádchu, meaning "pine mountain."

The law that provides that cruisers shall be called after cities has given an Indian name thus far to but one vessel of this class—the "Chicago;" the name borne by the cruiser "Topeka" being merely an Indian corruption of the English word potato.

The meaning of the word Chicago (spelled by early French writers Chicagou) is obscure. Nevertheless, this has not prevented the following idle guesses from being made as to its signification: "Place of Skunks;" "Place of Wild Onions;" the "Deity;" "Thunder;" the "Voice of the Great Manito;" "King;" and the name of a chieftain signifying "Strong." There are two things which can be stated with positiveness in regard to the word Chicago: (1) That it was the name of a village of the Miamis; and (2) that in the dialect of these Indians it had none of the meanings that has thus far been ascribed to it.

The name of the auxiliary cruiser "Yosemite" is (to use the words of Mr. Stephen Powers) a "beautiful and sonorous corruption" of uzúmaiti (oo-zóo-my-tee), the Miwok Indian name for the grizzly bear. The word as a name for the beautiful valley so called, came into use about 1851, and the credit of its application is accorded to a Dr. L. H. Bunnell. Among the Indians themselves, the name of the valley is Awáni.

The name borne by the "Monocacy" is derived from that of a small tributary of the Potomac, near which, in the vicinity of Frederick, Md., on July 9, 1864, the Confederates under General Early defeated the Federals under General Wallace. The name of the river near which this engagement took place represents the Lenape word Menágassi, meaning a "stream having several large bends."

In the nomenclature of gunboats, and of such yachts and tugs as have been converted into vessels of this class, the Navy Department has selected a few names of Indian origin: Thus, the name of the gunboat "Machias" (so called after a town on the coast of Maine) represents the word Matsiéss, or "lazy bird," the Passamaquoddy name for the partridge or ruffed grouse. The armed tug "Wompatuck" bears the name by which the Canada goose was known to the Massachusetts and Narragansett Indians. The tug Osceola is so called after a famous Seminole warrier, whose name, correctly spelled, was Assiyahóla, or "Black Drink Shouter."*

The name of the torpedo boat destroyer "Yankton" is shortened from a Dakotah word meaning "villages of the border," and designating one of the divisions of the Dakotah people.

In the designation of the dispatch boat "Oneida," we have a slight alteration of the Iroquoian word Oneyieta, meaning "standing stone."

We now come to the most important part of the navy, that constituted by the battleships, which, as well known, are by law christened after the States of the Union. Of this class of vessels thus far called after States having names of Indian origin are the "Texas," "Massachusetts" and "Iowa," now in commission, and the "Kentucky," "Wisconsin" and "Alabama," under construction.

The name of the State borne by the first named of these vessels had, like that of many other States, a local origin. It began with Tachies, the name of a Caddoan tribe which formerly lived upon an affluent of the Sabine River. This tribal name, changed to Tachus and Tekas, and finally to Texas, was first applied, in the latter form, to a prairie called Bradshaw Place, on the east bank of the Neches River, and was afterward extended to the entire territory now embraced in the State so called.

It was the Blue Hills of Milton and Quincy that gave the State of Massachusetts its name. These were known to the Indians as Massadchúash, or "great hills," a word which, with the locative suffix, becomes Massadchuáshet, meaning "at the great hills." The terminals in the present form of the word is the sign of the English plural, and is superfluous.

Much research has been wasted in the attempt to ascertain the meaning of the State name borne by the battleship "Iowa." Washington Irving, with the license allowable to an imaginative writer, states that the word means "beautiful," and explains its application by saying that a certain tribe which, in its wanderings, arrived at the highest point in the Iowa prairies, looking over the vast expanse of country, uninterrupted by hills or swamps, involuntarily uttered the word Iowa, meaning "beautiful." A certain number of authors have taken Irving seriously, and adopted his fanciful etymology. The State derives its name from a Siouan tribe which lived on the Des Moines River, and called itself Pajoha, or "Gray Snow," but to which some of its neighbors gave a name that has been variously spelled Aiaoue, Ayaway, Ahyahwah, Ahwahhaway, Iaway, etc., and, until the organization of the territory in 1838, Ioway. The Indian language to which this word belonged (and consequently its meaning) has not been determined.

The battleship "Wisconsin" will do duty under a name which has been interpreted "strong stream" and "wild rushing river." The State so called derives its name, it is true, from the largest river which intersects it—the Ouisconsing, as the word was formerly and properly spelled. Ouisconsing, however, was not the Indian name of a river, but of a locality. In the Otchipwe dialect, to which the word belongs, ouiskons is the name for the small lodge of a beaver or musquash, and this, with the locative suffix, becomes Wiskonsing, "at the small lodge of a beaver or musquash." The stream itself was called by the same Indians Ouiskonsisibi, or "beaver (or musquash) lodge river." Such transferences of aboriginal names are very common in our geographical nomenclature.

Although the phrase "dark and bloody ground" might, on certain occasions, prove quite apposite as a designation for the deck, at least, of a war vessel, if not for the vessel itself, such is not, as has been generally supposed (ever since some extremely careless reader of Filson* put the statement upon record), the meaning of the name "Kentucky" that has been given to one of the battleships now under construction. Nor does this word signify, in the language of the Shawnees, the "head of the river," as has been stated. Most of the land embraced in the territory called Kentucky was claimed and sold by the Six Nations, and the true origin of the name, as suggested by Fathers Marcoux and Cuoq, is, doubtless, to be found in the Iroquoian word Kentáke, meaning "at the prairie land."

The battleship "Illinois" will sail under what may be called a hybrid name, consisting of an Indian word with a French plural suffix. The State so called assumed, upon its organization, the name of a territory that had long been mapped as the "Illinois country," and which was called by the French "Le Pays des Ilinois," from several tribes of Indians of which representatives had been met by Fathers Allouez and Marquette while they were laboring respectively among the Otchipwés and Ottawas, and who spoke a dialect slightly different from that of the latter. Thus, while in Otchipwé and Ottawa the term for "man" (or, more accurately speaking, individual of the "native" or "common" type) was Inini, the same word in the more southerly dialect was Ilini, from which the Jesuits, with the addition of the French plural suffix, made the distinctive name Illinois, which, at that period of the French language in which it was first used, was pronounced Il-ee-náy.

The battleship recently launched and christened "Alabama" bears a name which was that of a Muskhogean people (Alibámu; plural, Alibámalgi), and the meaning of which is not known, even to the remnants of the tribe now living. Nevertheless, some one long ago interpreted the word as "here we rest," and the State of Alabama adopted the phrase as its motto.

* This name is said to be expressive of the effect produced by a copious imbibition of "assi" (called by the white settlers black drink), an exhilarating beverage prepared from the leaves of Ilex cassine, and used by all the Indian tribes that formerly inhabited what are now the Southern States.

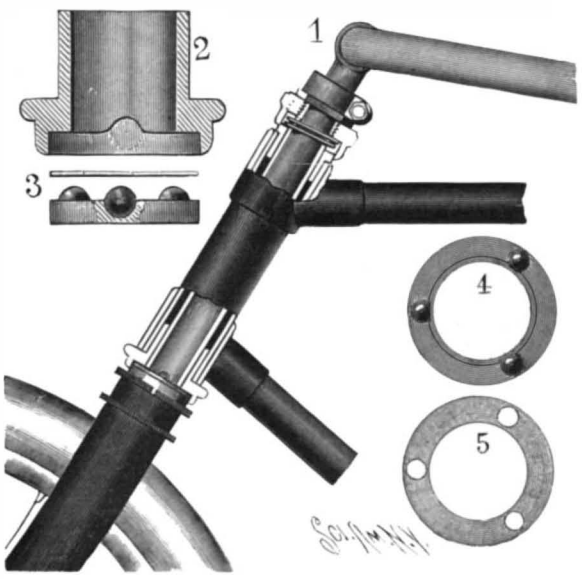
* The Discovery, Settlement and Present State of Kentucky. By John Filson. Delaware, 1784.

IN order to capture fish, Pool states that the natives of Surinam whip the water with the wood of Lonchocarpus violaceus, Bth., a papilionaceous tree which contains a substance having a narcotic action on the fish. The wood, which has a disagreeable odor, is called "Nekoe" by the natives, and stinkwood by European settlers.—Pharm. Centralh., xxxix., 282, through Nederl. J. Jdschr. o. Ph., 1798.

© 1898 SCIENTIFIC AMERICAN, INC.

AN AUTOMATIC STEERING HEAD FOR BICYCLES.

A patent has been granted to Antonio C. Garcia, of Modesto, Cal., for a novel steering head, by means of which the front fork and wheel are automatically returned to their proper positions by the weight of the rider. Of the accompanying illustrations, representing parts of the improvement, Fig. 1 is a bicycle steering head with portions broken away to show the improvements attached; Fig. 2 is a vertical section through a



GARCIA'S AUTOMATIC STEERING HEAD FOR BICYCLES.

bearing cup at the lower end of the steering head; Fig. 3 represents a ball-ring and felt washer separated, but showing their position relative to the bearing cup; Figs. 4 and 5 are plan views of the ball-ring and felt washer respectively.

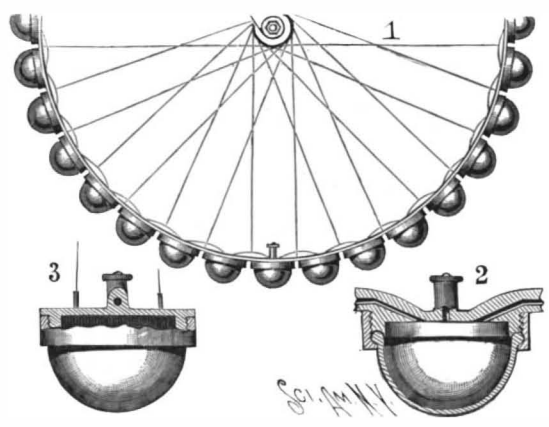
Referring to Fig. 1, it is seen that the fork and the head are substantially the same in appearance as in ordinary bicycles. But on the upper surface of the fork-crown, the ring, shown in Figs. 3 and 4, is properly secured and prevented from turning by means of a pin. In a series of hemispherical recesses in this ring balls are placed. The cup, represented in Fig. 2, consists of a sleeve inserted within the tube, properly secured, and is provided with a flange extending downwardly from the base and embracing the ball ring, as shown in Fig. 1. The bottom of the cup has radially extending grooves with sloping sides adapted to receive the balls. The felt washer illustrated in Fig. 5 lies between the ring and cup, as indicated in Fig. 3, is provided with holes to receive the balls, and is saturated with oil to lubricate the parts.

When the fork is turned the ball ring, revolving beneath the cup, will cause the head to be slightly raised, due to the balls traveling up the inclined surfaces at the sides of the grooves. The rise in the head is small, never exceeding half the diameter of the balls. When the handles are released the head will be brought back to its normal position by the balls rolling down the inclines at the sides of the grooves. The wheel is thus automatically brought back to a straight position by the weight of the rider acting upon these inclined surfaces.

Within the upper end of the steering head another cup is secured, also having downwardly projecting flanges. A spiral spring within the upper cup holds the lower cup down upon the balls, but upon compression permits the head and lower cup to rise.

A NOVEL PNEUMATIC TIRE.

The tire which we illustrate is in general characterized by a rim having a number of pneumatic bulbs



FONTEINE'S PNEUMATIC TIRE.

projecting outwardly, and serving as the tread of the tire, the bulbs being in communication with one another, so that they may be simultaneously inflated or deflated.

Fig. 1 is a side elevation of a portion of a wheel, with the device attached. Fig. 2 is a fragmentary longitudinal section of the tire. Fig. 3 is an irregular transverse section, with part of the bulb in perspective.

The tire is provided with a metallic rim in which the bulbs are secured. The rim has a series of annular ribs on its outer surface, and on each rib there screws a clamping band. The bulbs are provided with beads at the edges of their bases, as shown in Fig. 2, which beads are held between the ribs and clamping bands. The rim on its inner surface, it will be observed, is provided with equidistant arc-shaped enlargements connecting adjacent bulbs. As indicated in the sectional views, these enlargements are provided with passages which establish communication between the bulbs. A single nipple in one of the bulbs can therefore be used to inflate all the bulbs simultaneously.

The bulbs being independently movable, any one of them can, when punctured, be fitted with an interior skin or film of fabric. The repaired bulb can then be replaced and the tire inflated. The pressure of the air will force the interior skin against the inner walls of the bulb, thus closing the puncture. The tire is the invention of Herman A. Fonteine, of Auburn, N. Y.

Petroleum in Maccabees.

An interesting confirmation of the accuracy in practical matters of what are called the apocryphal Scriptures may be found in a consideration of the modern uses of petroleum, says The New York Sun. One of the very earliest mentions of this natural product is in the second chapter of II. Maccabees, although Herodotus is said to have referred to this "rock oil" about 200 years earlier. The fact that no commercial use of the oil was made does not prove that the existence of it was unknown, for the existence of petroleum was known in the United States for many years previous to 1859, when it first became commercially important. If an enterprising people like the Americans allowed the oil to lie untested for half a century or more, it is no matter of wonder that the people of Persia ignored its presence.

At all events, the account in Apocrypha has such a stamp of truth about it that the contempt of the distinguished commentator Bishop Wace seems hardly warranted. The history of the Maccabees is contained in five books, of which the Protestant churches call the first two only apocryphal. In book 2, chapter i., verse 19, we read:

"For when our fathers were led into Persia, the priests that were then devout took the fire of the altar privily and hid it in an hollow place or a pit without water, where they kept it sure, so that the place was unknown to all men. Now, after many years, when it pleased God, Neemias, being sent from the King of Persia, did send of the posterity of those priests that had hid it to the fire; but when they told us they found no fire, but thick water.

"Then commanded he them to draw it up and to bring it; and when their sacrifices were laid on, Neemias commanded the priests to sprinkle the wood and the things laid thereupon with the water. When this was done and the time came that the sun shone, which afore was hid in a cloud, there was a great fire kindled, so that every man marveled.

"And the priest made a prayer while the sacrifice was consuming. . . . Now, when the sacrifice was consumed, Neemias commanded the water that was left to be poured on the great stones. When this was done there was kindled a flame, but it was consumed by the light that shined from the altar. So when this matter was known, it was told the King of Persia, that in the place where the priests that were led away had hid the fire there appeared water, and that Neemias had purified the sacrifices therewith. Then the king, inclosing the place, made it holy, after he had tried the matter. And Neemias called this thing naphthar, which is as much as to say, a cleansing, but many men called it nephi."

To one acquainted with the natural springs from which petroleum flows in the petroleum regions, it seems at least probable that the "thick water" found where the fire had been hid by the priests was petroleum, or a spring of water that brought up petroleum to form a thick scum over the pool. For when the naturally produced petroleum of the present day is thrown over wood it will, as every petroleum producer knows, serve to make the wood burn more fiercely. And then, as to the great fire that was kindled when the sun came out from behind the cloud, it is to be remembered that the thermometer rises to more than 140° Fah. in the direct rays of the sun on the plains of Persia, and that the lighter parts of crude petroleum are inflammable at that temperature. Moreover, the priests may have used the sun glass, that was not unknown in those days.

Referring to the use of the word "cleansing" in the quotation above given, the commentator says:

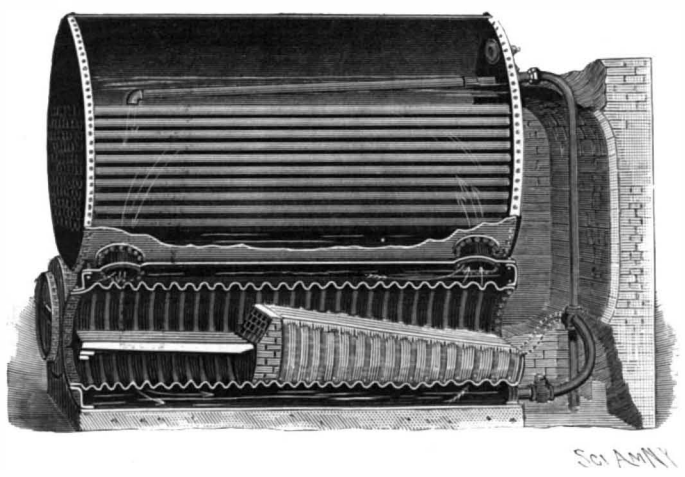
"The MSS. vary between nephthar,' 'nephthai' and 'nephtha.' No word at all near to any of these forms has the meaning of 'a cleansing' in Hebrew. It has been conjectured that the original word used was nithhar, which might perhaps have this meaning; but more probably the etymology of the forger of the letter was at fault, and he gave a fanciful explanation of a word whose true meaning was unknown to him. Naphtha was the name given by the Greeks to a form of mineral oil produced in many parts of Persia, which was highly inflammable; and it is this Greek term which the author of this letter intended to use. Perhaps he misspelt it, or perhaps it was corrupted by the copyists, first into 'naphtha,' and then further into 'nephthar.'"

Of course, with the modern uses of benzine as a cleanser in mind the matter becomes clearer; while, if to the mere cleaning properties of this petroleum product be added the healing properties which the Hebrews always associate with cleansing, and the long known cures effected by petroleum be kept in mind, the accuracy of the Maccabees historian is confirmed beyond question.

A NEW STEAM BOILER AND FURNACE.

The illustration which we present herewith represents an improved steam boiler of the horizontal fire-tube type, having a chamber extending longitudinally below the boiler shell.

The boiler is provided with the usual series of fire-tubes running longitudinally. Two exterior furnace shells are located beneath the boiler, each having a circular water space extending throughout its length. The furnaces are provided with a corrugated cylindrical fire wall of such diameter as to leave a space between the wall and the outer shell, and have the usual grate bars and provisions for securing a good draught. The boiler shell and furnace are at each end connected by thimbles which permit the communication of the water spaces in both boiler and furnaces. Extending between the water space of the furnaces and the interior of the boiler are one or more water circulating pipes exposed to the heat of the furnace. By this means the water passing upward is heated before entering the boiler. The feed water passing from a cold water supply is introduced within the lower portion of the upright circulating pipe, causing the feed water to mingle with the water circulating between the boiler and water space in the furnace and heating it before being introduced in the boiler.



HOPKINS' STEAM BOILER AND FURNACE.

The rapid, continuous and uniform water circulation throughout the interior of the boiler assures its maximum efficiency as a generator of high-pressure steam, and is designed to obviate the strains due to the unequal expansion of the material composing the boiler.

The furnace and boiler are the invention of William Hopkins, of Dubuque, Ia., and are manufactured by the Iowa Iron Works, Dubuque, Ia.

Elevated Trains on the Brooklyn Bridge.

The Brooklyn Elevated Railway Company began running trains over the Brooklyn Bridge on June 18, and the trains have become very popular, as they run directly to Coney Island, the great day resort of New York. A new platform has been built out toward Park Row, on the New York side, which is used to take on passengers, and the passengers make their exit by the old bridge platforms. The cars have been provided with central side doors and cable grips. It is possible for passengers to take a train at City Hall in New York and be at Manhattan Beach in fifty minutes. As soon as the junction can be made with their present structure, the Kings County Elevated road will also run trains over the bridge. The trains for both elevated railways will pass through the yard at the Brooklyn side and then out on to the regular tracks of the elevated roads. The trolley cars upon the bridge are an unqualified success.

Local Anæsthesia Electrically Induced.

While making experiments on the sensations derived from sinusoidal currents, it was recently discovered by Prof. Scripture, of Yale, that anæsthesia of the tissues resulted from currents of high frequency, the condition even persisting for some time after removal of the electrodes. This should excite the attention of medical men, surgeons more especially · and if such local anæsthesia proves to be wholly practicable and safe, such will prove a veritable boon indeed.

© 1898 SCIENTIFIC AMERICAN, INC.

SOMETHING NEW IN WOOD-WORKING MACHINERY.

The increasing demand for greater production of ripping material without increase in driving power and waste in saw-kerf has resulted in the introduction of the new self-feed band ripping saw illustrated herewith—a machine that cannot fail to interest those who are engaged in the reduction of lumber to exact parallel widths for flooring, ceiling, siding, etc.

This machine rips material to a width of 24 inches and a thickness of 10 inches; carries a saw blade 3 inches wide and is regularly provided with three speeds of feed, viz., 50, 100 and 150 feet per minute.

The frame has a straight upright column to support the crosshead for the feeding mechanism and the upper wheel. The crosshead is gibbed to the column, is vertically adjustable for variations in length and proper tension of the blade and is operated by the ratchet lever.

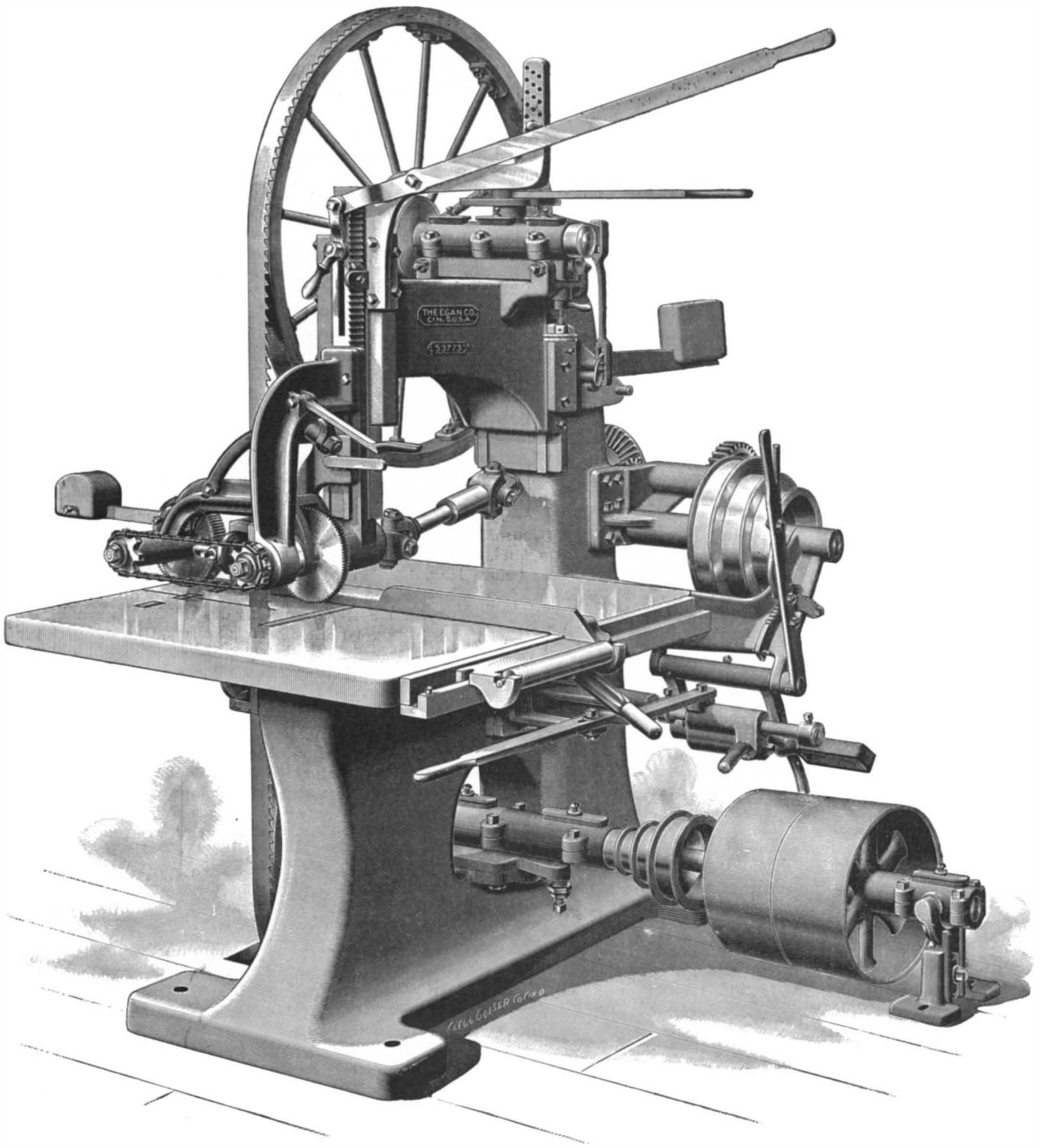
The wheels are 42 inches in diameter and are mounted on steel shafts. The top shaft is 1 15/16 inches and the lower shaft 2¼ inches in diameter, both running in long, self-lubricating bearings, which are adjustable for purposes of alignment and for the purpose of properly tracking the saw blade.

The top wheel is quickly adjusted, is balanced on a knife edge and can adjust itself to favor the blade.

The table is made of iron, the dimensions being 3 feet 6 inches by 3 feet 8 inches and is provided with a quickly adjustable fence that admits ripping up to 24 inches in width. Small rolls in the table reduce the friction of the material.

The feeding mechanism consists of two feeding disks, one receiving and the other delivering the material, both being mounted in suitable bearings, supported on a heavy slide gibbed to the crosshead which carries the upper wheel.

This mechanism is controlled by the long lever shown, so as to ease up when there is too great a variation in the material, or to lift the feed instantly from the stock. The delivering disk is independently weighted and can be lifted out of the way when not in use. In conjunction with this feeding device, the upper frictionless wheel-guide for receiving the back thrust of the saw and relieving it of friction is used. The guide is also provided with side plates for retaining the blade in a vertical line, and, since it is operated in connection with the feed, it is raised or lowered with the latter, always retaining its relative position.



THE NEW SELF-FEED BAND RIPPING SAW.

The guide, however, can be independently adjusted vertically. This is of advantage when it becomes necessary to lift the feed rolls to use the machine as an ordinary band, scroll or rip saw. The guide, moreover, can be lowered 5 inches below the rolls.

The changes in the speed of the feed are accomplished by means of cone pulleys provided with a belt tightener under the control of the operator.

The designers and manufacturers of this machine are the Egan Company, 327 to 347 West Front Street, Cincinnati, Ohio.

IN proportion to its size, a fly walks thirteen times as fast as a man can run.

The Deterioration of Paper.

The subject of the lasting qualities of paper is a most important one, as upon it depends very largely the permanence of our literature. It is a curious fact that nearly every large library which circulates books is obliged from time to time to throw away books which are really worn out. If we compare these books with old theological works from a monastic library, which very nearly approximates the conditions of the circulating library, we find that the old hand-made paper has stood not only the effect of time, but usage as well, much better than the modern papers.

The report of the committee appointed by the Society of Arts to consider the causes of the deterioration of paper is printed in a late number of the society's Journal, and is here summarized. At the outset, the report points out that during the present century the paper-making industry has undergone many revolutionary changes. As an industry it has grown considerably, and to meet the requirements of the enormously increased production a quantity of new fibrous raw materials have been introduced and have taken their place in due course as indispensable staples. The more important of these, so far as concerns this country, are esparto, in the period 1860–70; "mechanical wood" or ground wood pulp, in 1870–80; the wood celluloses, in the period 1880–90. These substances differ in chemical composition from the celluloses obtained from cotton, flax and hemp, which were the exclusive staple raw materials for paper making up to this century; and although they are efficient substitutes in most respects, it must be admitted that time has not yet been able to pronounce a judgment upon the relative permanence of the papers made from them. There is more than a suspicion that many of them are very inferior in this important respect, and it has been the main purpose of the work of the committee to sift the evidence upon which suspicions have been engendered.

The committee referred to above have examined a number of books as evidence of "deterioration of paper;" some submitted by librarians in a condition of complete disintegration; some of their own selection exhibiting various grades of deterioration of the paper of which they are composed. They conclude on the evidence before them as follows: As to the two tendencies to deterioration of papers, these are marked (1) by disintegration, (2) by discoloration. They are independent effects, but may be concurrent. They are notably so in papers containing mechanical wood pulp. Actual disintegration has been brought to light in papers of all grades; from those of the best quality as regards the fibrous materials of which they are composed, i. e., rag papers; also, of course, in those of lowest quality, i. e., containing mechanical wood pulp in large proportions. It is generally the result of chemical change of the fibers themselves. As to the causes determining such changes: In the case of the rag papers examined the effects appear to be due to acid bodies; the disintegration may be generally referred to acidity. In the case of mechanical wood pulp, the effects are traceable to oxidation pure and simple; the disintegration is accompanied by a basic or alkaline reaction of the paper. Discoloration may be said also to affect all papers more or less, and without discussing minutely the chemistry of the changes, the evidence obtained certainly warrants the general conclusion that discoloration of ordinary cellulose papers (as distinguished from those containing mechanical wood pulp) under usual conditions of storage is proportional to the amount of resin which they contain, or more generally to the resin and the conditions employed for fixing it in the ordinary process of engine-sizing. The committee have been desirous of bringing their investigations to a practical conclusion in specific terms, viz., by the suggestion of standards of quality. They limit their specific findings to the following, viz., (1) normal standard of quality for book papers required for publications of permanent value. For such papers they specify as follows: Fibers.—Not less than 70 per cent of fibers of the cotton, flax, and hemp class. Sizing.—Not more than 2 per cent resin, and finished with the normal acidity of pure alum. Loading.—Not more than 10 per cent total mineral matter (ash).

A New Way of Preserving Meat.

A new method of preserving freshly killed meat has been discovered by a Danish zoologist, August Fjelstrup, who is the discoverer of condensing milk without the use of sugar. The system has been used in a Danish slaughter house for three months. The animal is first shot or stunned by a shot from a revolver in such a way as not to injure the brain proper. When the animal drops down senseless, an assistant cuts down over the heart and opens a ventricle, which allows the blood to flow out, the theory of this being that the decomposition of the blood is almost entirely responsible for the quick putrefaction of fresh meats. Immediately after the blood is let out, a briny solution, which varies in strength according to the time the meat is to be kept, is injected by means of a powerful syringe through the other ventricle into the veins of the body. The whole process takes only a few minutes and the beef is ready for use and can be cut up at once.

© 1898 SCIENTIFIC AMERICAN, INC.

Science Notes.

Prince Luigi of Savoy, Duke of the Abruzzi, recently took a balloon trip from Turin, accompanied by his personal adjutant, Lieut. Cagrie, and the French aeronaut Godard. The day was squally, so that the duke, after being driven far enough south to see the Riviera, as far as Vintimiglia and Monaco, and then northwest to Mont Cenis, was at last landed, at the end of five hours, near his starting point, Turin. The highest altitude reached was 6,000 feet. Naval Lieut. Cagrie's post is no sinecure. He has been obliged to accompany the prince to the top of Mount St. Elias, will be in his Arctic expedition next year, and on this balloon trip was dropped as superfluous ballast at the point furthest from Turin reached by the balloon.

Artists in photography will be interested in a statement made in The Engineer, London, that Arthur W. Clayden, fellow of the Royal Meteorological Society and head of the college at Exeter, exhibited in a recent lecture on photographing meteorological phenomena some lantern-slide views of clouds taken by him after a process recently invented by him—photographs showing beautiful blues in all their shades, from ultramarine down to perfect white, various grays and some iron-red and greenish tints. The revolutionizing feature of the Clayden process consists in the fact that these colored photographs are positives; that is, according to the statement given out, he has succeeded in obtaining colored prints by a purely chemical way of developing the same on a specially prepared plate. The process at present is restricted to lantern slides, but these are not colored by painting but by development, while colored paper prints loom up distinctly in the near future. Bright red rays, the inventor says, have so far escaped him, but he believes that further experiments and probably a longer development will realize the mastery of that defect. As an intermediary stage between plate prints and paper printing, ivory or thin celluloid plates have been suggested.

In The Monthly Weather Review for February an interesting account is given of the value of a searchlight for making weather signals known in large cities or seaports at an hour of the evening when it is too late to give warning by the usual method. In the month of February, 1895, the searchlight for the unfortunate battleship "Maine," then nearing completion, was lent for temporary use at the Chicago office of the Weather Bureau, and the experiments were conducted by the present chief of the latter institution. From observers and other persons it was ascertained that the signals were clearly seen at a distance of twenty miles. At present the great cost of maintaining the apparatus in operation would preclude its adoption, but in the event of the expense being eventually reduced, the author thinks it might be used by the Weather Bureau for the purpose of immediately disseminating forecasts made from the evening observations.

At a recent meeting of the Paris Academy of Medicine, M. Grancher read a report on tuberculosis, in which it is recommended again (confirming resolutions arrived at in 1890) that all sputum should be collected in vessels containing a solution of carbolic acid, or else water; that sweeping should be avoided as much as possible, dust, etc., being removed or wiped off with a damp cloth, and that all milk should be boiled before it is consumed. With reference to family practice, the Academy recommends to all medical men the continued application of these prophylactic measures from the time when tuberculosis is diagnosed, and also, if possible, to keep the disease quiescent by means of an early diagnosis and proper treatment. With regard to the army, the Academy suggests that early cases of tuberculosis, in which the expectoration does not contain bacilli, should be invalided temporarily, and permanently as soon as sputa are found to contain Koch's bacilli. The Academy makes an appeal for the earnest co-operation of the military and hygienic authorities to see that the recommendations are carried out in every barrack.

M. P. Villard, in The Comptes Rendus of May 16, describes a peculiar effect he has noticed when experimenting with fluorescent screens of barium platinocyanide. If an obstacle, as, for example, a sheet of glass or metal, is interposed for a few minutes between the screen and the source of rays, and then removed, he found that the part which had been in shadow exhibited a stronger fluorescence than the remainder of the screen. He also found that the parts of the screen which had been exposed to the stronger action of the rays became slightly brown, as compared with the protected part, as if a chemical action had modified the fluorescent salt. This impression on the screen remains until it has been exposed to light for some time. The same effect is observable with platinocyanide of potassium, and takes place equally, whether the salt has been simply placed on a sheet of glass or varnish has been used to fix it. It appears from these results that it is not advisable to keep fluorescent screens inclosed in boxes in the form of stereoscopes as is usually done, but that they should, on the contrary, be exposed to daylight when not in use.

How to Make a Genealogical Search.

Mr. Edwin Stanley Welles has written an interesting account in The Independent upon how to make a search for ancestors. Within the past few years there has been developed a remarkable interest in the pursuit of genealogical investigation. Step into any historical library and you will see men, and still more women, trying to hunt up their ancestors among the various historical and genealogical books. It is a fascinating study, and grows more fascinating as the investigator proceeds; but it is beset with subtle difficulties, which at times dishearten the most courageous seeker. If one enters upon a search, he must expect to find his trail suddenly disappear; and he will be compelled to put forth his best efforts to discover its onward course. It may be, however, some consolation for him to know that a clear, easy search is most unusual.

The majority of those who want to know about their ancestors—who they were, where they lived, and whether any of them served in the colonial or revolutionary wars—have only the vaguest ideas of the way in which to proceed. "The trouble," said one of our librarians, "with the women who attempt to trace up their ancestors is, that they do not know how to make an investigation." This remark, it is needless to say, is quite as applicable to the men who undertake a search without some previous training.

Now let us watch a genealogical expert as he conducts an investigation. He starts, let us say, with the following data: that Mr. Brown's grandfather Jonathan Brown lived in Coventry, Conn., as late as 1800, when he removed to Western New York, where he died some twenty years afterward, at the age of 76. He had married and his children were all born before his change of residence; but the maiden name of his wife, the time of their marriage and the dates of their children's births are not known. The grandson has found the trail clear up to 1800, but back of that he is wholly in the dark.

What will the genealogist do with these data? First of all, he will ascertain whether the grandson has properly searched the printed books that may contain the requisite information. The chances are that he has not; so the genealogist will begin by consulting at least these three standard genealogical works, which are to be found in every well equipped historical library: 1, "Savage's Genealogical Dictionary of the First Settlers of New England, showing Three Generations of those who came before May, 1692" (4 vols.); 2, "The New England Historical and Genealogical Register" (49 vols.); 3, Hinman's "Puritan Settlers of Connecticut" (1 vol.) These three works, together with the "Essex Institute Historical Collections" (33 vols.), are well-nigh indispensable to the student of early New England genealogies.

Of course, the genealogist will notice whether there is a "Brown genealogy," and such being the case, whether it treats of his particular Mr. Brown of Coventry; he will also ascertain whether there is a history of the town of Coventry, and if there is one, whether it contains the genealogies of the old families there. But suppose all these sources fail to give any light? Possibly Mr. Brown's ancestors were too obscure to be mentioned, or no one has ever traced them out; and, generally speaking, the facts most essential to obtain are not to be found among the printed records.

In Connecticut, however, there is one important exception—the names of those who served in the Revolutionary War and in the War of 1812 have been printed by the State, although these lists are, unfortunately, somewhat incomplete. Having exhausted the printed works that might bear on this case, the genealogist now turns to the most fruitful sources of information, which may be termed "the manuscript records." There are at least four sets of these records, which he will closely and carefully examine before he will be willing to make a report. These are: 1, The Land Records of the Town; 2, The Town Records of Births, Marriages and Deaths; 3, The Church Records of Baptisms, Marriages and Deaths; 4, The Probate Records.

A few words of explanation should be given about these different records. In the first place, then, it is not safe to trust the indexes of the early Land Records. In some instances they may be accurate, but, ordinarily, they have been carelessly made. Over and over again, they have failed to reveal important facts hid away in their musty tomes. We must "wade" through them, if we wish to be sure of our results. And as so much utterly untrustworthy work has been produced by simply glancing through the indexes, one should not rest contented until he has patiently gone through those formidable volumes page by page.

The Town Records of births, marriages and deaths are sadly fragmentary as a rule, and each name should be deciphered, without depending upon the index. Sometimes such lists are to be found scattered among the volumes of Land Records.

In most of the old New England towns there are early Church Records of baptisms, marriages and deaths which frequently supplement the corresponding town records. They are usually kept with the clerk of the church or the minister of the parish. Anciently the minister made the entries, and their fullness and accuracy depend upon his faithfulness in entering each record. Occasionally, when an examination of all these records fails to disclose a much coveted fact, like the age of a child or the maiden name of the widow, the Probate Records will yield the information. The wills, inventories and distributions contain a vast amount of curious and valuable information.

When the genealogist has completed a thorough examination of these four sets of records, it will be strange if he does not make some important discoveries. In our supposed case of Jonathan Brown, the Land Records of Coventry will show whether he owned property in that town, and, if so, when he bought it and when he sold it. Perhaps the will of his father, if found at the Probate Office, will disclose the fact that he inherited it, and his marriage will probably appear either on the church or town records. And so, step by step, the line is followed back, and generally several towns have to be visited.

Possibly the genealogist will be obliged to scan the headstones in some old churchyard to supply a missing date. In Connecticut, if a record of service in the colonial wars is desired, he will have to examine the manuscript muster and pay rolls in the State Library at the capitol, Hartford, and in carrying his search still further back he will be likely to consult the early Court Records. But enough has now been given to show the seeker after genealogical information how to go to work. If he cannot undertake a personal investigation or feels incompetent to do it, his wisest course is to select an experienced genealogist familiar with every branch of genealogical work. Learn his prices in advance, send him all the data, and he will be able to trace the family line if any existing records bear the impression of its course. He cannot do impossible things, for he cannot ascertain facts when the facts are wanting in the records; but he can often disentangle a very perplexing genealogical snarl. And, finally, be it observed, that it is only by much patient and persistent delving that real genealogical treasures are unearthed.

The Metric System as Applied to Textile Manufactures.

The uniform numbering of textile fabrics is of great importance to the textile manufacturers of the world. At present many different rules are in use, all of them being dissimilar. In France, which is the cradle of the metric system, the numbering "kilometrique" is used only for cotton thread and "bourre de soie." This unit is based upon the relations between the weight in demikilogrammes and the length in kilometers. There is great confusion in the international numbering; in fact, few people can distinguish, in the many complicated modes of numbering, the exact numbering of thread intended. Uniformity in this matter would greatly simplify the technique of the textile industry, but to accomplish this result it is necessary to establish an invariable rule, which can only be done by the cooperation of manufacturers. This question has for a long time occupied the attention of those interested in the industry. It was the subject of investigation at five successive congresses: Vienna, 1873; Brussels, 1874; Turin, 1875; and Paris, 1878 and 1889. The subject will be brought up again at the International Exposition to be held at Paris in 1900. At all the former metric congresses, while progress has been made, no practical results have been obtained. This has resulted from the fact that the metric system has not yet been adopted by all countries and uniformity has not become general, even in France. Both England and the United States place goods in foreign markets that are not numbered and manufactured according to the metric system, but as this country is now making strenuous efforts to compete with other nations with foreign trade in merchandise, it would seem that our textile manufacturers would do well to be represented at the congress at Paris in 1900. It is, of course, well to employ the system of weights and measures to which foreign buyers and consumers are accustomed. Failure to do this has lost Great Britain a portion of her trade, and it also prevents the United States from having as much trade as she would otherwise have.

IT is well known that milk is more or less altered in taste and color by sterilization. Dr. A. Wroblewski finds from the results of his experiments to ascertain the effect of sterilization on the chief constituents of milk, such as milk sugar, albumen and casein, that milk is so far altered by sterilization that the milk sugar is partly caramelized—a very small amount of lactic acid being also formed—the albumen is coagulated, and the casein partly precipitated, or at least brought into such a condition that it can be readily precipitated by acids. Pasteurization acts in a similar manner, but to a less extent. It is concluded, however, from a chemical point of view, that milk is not rendered less favorable to digestion by being sterilized.—Oesterr. Chem. Zeit., i., 5.

© 1898 SCIENTIFIC AMERICAN, INC.

Correspondence.

Information Wanted.

To the Editor of the SCIENTIFIC AMERICAN:

I wrote you several days ago in regard to getting out a special number of the SCIENTIFIC AMERICAN or SCIENTIFIC AMERICAN SUPPLEMENT that will give a full description of the various kinds of guns and other weapons of the army and navy tha thave been devised during the last twenty-five years or so for modern warfare. I see from a line in the SCIENTIFIC AMERICAN that someone else has been suggesting the same idea. I feel more and more confident, as I stated to you in a former communication, that such a number of one of your esteemed papers would be most heartily received just now. I hope that, when you get out this number, among the things which you explain, you will make clear the difference between rapid-fire guns and machine-guns, also the difference between a rapid-fire and a slow-fire gun. You speak in some of your issues of the slow-fire 8-inch gun and then again you mention a rapid-fire 8-inch gun. Some of these rapid-fire 8-inch guns you say can be fired as often as three or four times a minute.

Then I believe that another very interesting feature of the paper, that would also be quite a selling point, would be to give a comparison between the guns of 25, 30, 40 and 50 years ago and the guns of to-day. For instance, the guns on the "Monitor," which fought the battle with the "Merrimac," only 35 years ago, I believe, were 11-inch guns, but those 11-inch guns are nothing like as powerful as the 4-inch guns of to-day. All of these questions the public are very much interested in, and very much is being said about them in many of the daily papers. One daily paper, however, will tell one story, and another, another; but if we can read it in the SCIENTIFIC AMERICAN, we know that we are getting the exact facts. We have never known the SCIENTIFIC AMERICAN to do much guessing.

We would be glad to hear from you in regard to this, either as a statement through the SCIENTIFIC AMERICAN that you are going to bring out such a number, or a line from you through the mails, but sincerely hope that you will not fail to get it out. I believe you will make a mistake if you do not. A. O. TAIT,

Ed. of Signs of The Times.

Oakland, Cal., June 10, 1898.

[The above is one of a large number of letters that have reached us on the subject, and, as we have stated in another column, our forthcoming SUPPLEMENT is brought out in the endeavor to meet these expressed wishes of our readers.—ED.]

A Seminary for Teaching Birds How to Sing.

Buying and importing song birds occupies the time and attention of several scores of people in New York, and as the distributing center of this peculiar trade, the city is often the home of considerable numbers of song birds gathered from all quarters of the globe. On the East side, in Fourth Street, there are several remarkable aviaries where, without doubt, a study of one branch of ornithology can be pursued under conditions more favorable than elsewhere on this continent, and a visit to one of these bird conservatories of music is better than a trip to the fields or woods to listen to the songs of the wild warblers. The owner of the aviary is a German—more than probable from some little village in the Hartz Mountains, where bird-raising is the chief industry,—and he not only feeds and tends his little birds with loving care, but teaches them to whistle and sing in tune to the accompaniment of an old reed organ or flute.

There are several large importing houses of song birds in New York, and in the busy season they employ from twenty to forty travelers who go back and forth from Europe to purchase the pick of the canaries, bullfinches and other European songsters. The consignments come chiefly from Germany and England. Nearly all of the canaries raised in the world for cage purposes come from these two countries, and most of the German exporting houses have distributing branches in New York. The birds are sent over by steamer in large consignments under the charge of an expert care-tender, who does nothing else but feed and doctor the little pets placed under his charge. One experienced man can take charge of five large crates, each one containing two hundred and ten cages of birds, or a little over a thousand in all. Sometimes during the rush season the care-tender has five hurricane deckers to watch, or fourteen hundred cages and birds to look after during the long hours of the days and nights.

That this work is not easy, any one who has had the privilege of looking after a single canary for a week can well understand. Feeding and watering over a thousand birds, and cleaning out their cages every day, makes up a routine of work on shipboard that begins at four o'clock in the morning and does not end until late in the afternoon. When seasickness makes life miserable for the passengers, the canaries are apt to be uncomfortable in their crowded quarters. Sometimes a disease known as "schnappen" breaks out among the canaries at such times, and as this is fearfully contagious, it sweeps through the crowded bird quarters on shipboard and decimates the ranks at a terrible rate. Cases are known where only ten birds have survived out of an importation of eight hundred to a thousand, the disease performing its terrible work in a week's time. This is supposed to be caused as much by the overcrowded and poorly ventilated condition of the birds' quarters as by the rolling of the ship. If you ask Fritz if his birds get seasick, he will answer emphatically, "No;" but he will add softly to himself "schnappen." And in that word is conveyed much of meaning that the lay mind cannot appreciate.

When the imported birds arrive in port, they are hurried immediately to the importing houses, or to the different quiet aviaries in the German quarters, where experienced bird-raisers take them in charge. It is at this latter place that one may make an inspection of the singers which are destined to carry song and delight into so many homes. Most of them are trained birds, and they sing and whistle to perfection, and all that their German attendant has to do is to feed and water them properly. If disease breaks out among them, he is supposed to know just what to do, and in most instances he does prove an expert bird doctor.

In the mating and breeding season, however, young birds appear in the great aviary which must be taught to sing and whistle accurately. Most people imagine that all the perfection of song cage-birds is inherited, and they would be surprised to learn the amount of labor bestowed upon them in order to make their tunes accurate. The young birds that have the proper voices for great artists are trained in the most careful manner. In the Hartz Mountains, where canary training reaches its highest development, the throat and voice of each young canary are tested, and those selected for the highest training are set apart by themselves. They are sent to a school of instruction that is unique in its methods. At the head of this school is probably a canary of the St. Andreasberg type, which strikes the right note for all the youngsters to imitate. The young birds are taken into the room in their cages, with cloth draped over them to shut out the light until the proper time has come for singing. Then the light is admitted and the teacher begins her warbling. The young birds, which have probably never yet attempted to pipe, leave off their feeding and listen to the marvelous outburst of pure song. They become uneasy and enraptured, and in a short time they try to imitate the song; but they make miserable failures for many days. Eventually some of them strike the right note, and at the end of the week the most promising ones are separated from the rest and placed in rooms with the best singers. In this way their voices are gradually cultivated, and new songs are taught them.

There are several such schools for canaries in New York, but they are devoted entirely to the comparatively few canaries raised for the trade in this country. Most of those imported have already been trained to sing accurately, although after their long sea voyage they need a little extra training to bring their voices to perfection. The best trained canaries are the St. Andreasberg canaries, whose notes are considered the finest of any in existence. Originally these notes were obtained by placing a nightingale in the breeding room of the young canaries, and the natural, clear-toned voices quickly blended the song in with their natural notes. In time, by careful breeding and selection, the present type of the St. Andreasberg canary was produced, but the pure, bracing air of the Hartz Mountains is considered necessary for the proper development of one of these superb singers. A true St. Andreasberg singer cannot, it is believed by bird trainers, be reared outside of the Hartz Mountains, and it is claimed that only about ten per cent of those raised in their native place ever pass the critical examination of the judges. They are sold according to the perfection of their song power, the best imported bringing as much as $25 to $50 apiece, and ordinary ones as little as $4 to $5. As a rule, they are very small and insignificant looking birds, and not until they have opened their little throats to sing does one comprehend their mission in life.

The German bullfinches are imported into this country in larger numbers every year, and, as they are trained with the greatest care, they are rapidly becoming as popular as the canary. The young bullfinches are taught their lessons when about two weeks old. They are then taken to a dark room, and at the proper time the trainer admits light and begins to whistle a tune. These German trainers are wonders in their particular line. Although deficient in many of the graces of life, they can whistle songs as correctly as another man can play them on a cornet or piano. One false note would be sufficient to ruin the teacher's reputation. Only one bird at a time can be taught, and each one receives an hour's lesson every day. Then another pupil is brought in, and the German trainer renews his whistling. So he whistles and whistles from morning until night, varying his labors only by teaching a different tune to a different bird.

In Germany the young bullfinches are first taught by the strains of a reed organ. They are placed in a dark room, while the trainer plays on a small organ by the hour. The birds have this drilled into them so thoroughly that when they do pipe, they strike the right note every time. The flute is also used extensively now by trainers, and it is a successful substitute for the whistle. The music formerly taught by the trainers was of the old style German hymns; but to-day nearly all of the bullfinches are taught to pipe the popular songs, operas and waltzes.

Prices for bullfinches vary also according to their accomplishments. Ordinary tamed, but untrained, bullfinches can be purchased in New York from $3 to $5, but those that are taught to pipe sell for considerably more. They are classified according to the number of tunes they have acquired. Thus a bullfinch that has mastered only part of a tune sells from $10 to $25, but one that pipes the whole of a tune without an error easily commands from $25 to $30, and a bird of two tunes is worth from $35 to $50. Extra fine bullfinches that pipe several tunes, and have remarkably sweet tones, bring as much as $75 to $100 in this country.

The song-bird dealers import many other gay singers to make life pleasant in our homes. The English nightingale is imported in fair numbers, and brings from $15 to $25 apiece. There is a great difference in the singing of the nightingale, as in all other birds, and only those that have been carefully reared and trained meet the requirements of the modern trade, notwithstanding their reputation for natural singing. Defects appear in some of the birds which cannot be remedied for several successive generations. The Pekin nightingale is a less desirable singer, but it has a certain popularity as a cage bird. Considerable numbers of them are brought to this country, and sold by the dealers from $5 to $10 apiece. But they are not trained as the canaries and bullfinches.

Other song-birds found in one of the East side aviaries, or importing bird stores, are the German chaffinch, the English skylark, the English starling, siskin, woodlark and European thrush. Prices for these in the retail trade may serve to show the value attached to the different kinds of singers. The best German chaffinches can be purchased from $3 to $10; English skylarks, from $3 to $12; English starlings, from $10 to $40, according to the number of tunes they can pipe; English woodlarks, from $3 to $15; and European thrushes, from $8 to $15.

Native song-birds are almost as much in demand as the imported, and every large bird store deals in most of our prominent singers adapted to cage life. Our Southern mocking bird, for instance, which rivals the English nightingale in the variety and brilliancy of its song, sells all the way from $3 to $50 apiece. Cage bobolinks are worth from $1 to $3; tamed robins, from $1 to $5; the Southern redbird or Virginia nightingale, from $3 to $5; the inimitable brown thrasher or thrush, from $3 to $8; and linnets, from $1 to $5. These native birds are rarely trained. They whistle or warble the wild tunes of the forest, and these possess a certain flavor of spontaneous music that is often more gratifying to the hearers than the most elaborate tune of the cultivated Campanini or St. Andreasberg canary.

G. E. W.

The Typewriter and Hearing.

In a recent number of The Phonographic Magazine, William Whitford points out that it is very essential a stenographer be possessed of exceedingly acute hearing, coupled with a goodly supply of what is vulgarly termed "gumption." This is very true; and as the result of a lack of these, and sometimes owing to the artificial mechanicality of the typist, so to speak, ludicrous and unpardonable mistakes often appear in a typewritten document, such as "changing stroke" for Cheyne-Stokes, "ammonia" for pneumonia, "ingestion" for direction, etc.; but it is also requisite that the person dictating should enunciate clearly, and call attention to any rare, technical and unusual word; further, the stenographer should not be permitted, as is too frequently the case, to sit with his or her back to the person dictating.

But it may not be known that the manipulation of the typewriting machine, with its continual noisy and monotonous tap-tapping, tends to further impair an already defective hearing. Most operators make more noise than is necessary, and by pounding fail to secure that clearness of lettering that is essential to good work. To individuals suffering in any degree from chronic middle-ear catarrh—and those who wholly escape are few indeed,—the use and noise of the typewriter is very deleterious, tending to increase the measure of deafness, which, however, may be temporarily mitigated by the use of less noisy machines or by greater care in operating. Eventually, however, the effect of the new machine equals that of the old, and even but two or three hours' work enforces the penalty and increases and accentuates the mischief already done. The effect is equally as certain, though more subtle, with that induced in boiler makers and other artificers who work where there is much hammering.

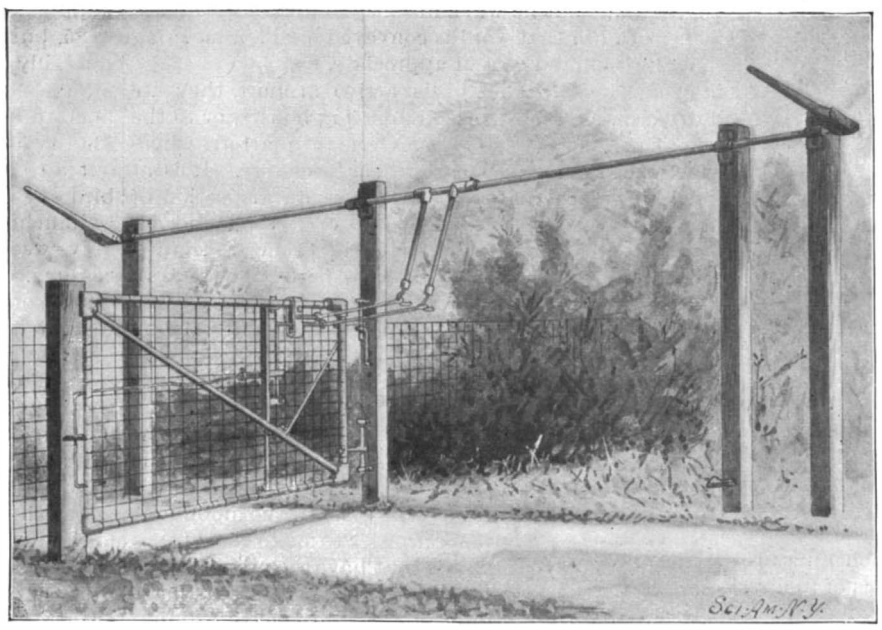
What is now demanded is a silent typewriting machine, and an inventor who can achieve this will earn the gratitude of a progressive people.

© 1898 SCIENTIFIC AMERICAN, INC.

AN IMPROVED GATE.

The accompanying illustration represents a gate which may be operated from a carriage, by turning operating handles which control the locking mechanism of the gate. The frame of the gate is preferably made of iron pipes and is filled by a network of wire. Extending a slight distance from the hinge post are two eyes adapted to receive pivot-pins which support the gate. To sustain the gate at any desired elevation, a rod is provided with an eye at its upper end surrounding the upper pivot-pin and beneath the upper eye attached to the gate. The lower end of the rod is bent to one side and is adapted to enter one of a series of holes in the hinge post. The gate is provided with a spring-closed latch sliding longitudinally upon the gate. An eye attached to the latch incloses the vertical member of a bent lever, pivoted by its lower end below the latch. A yoke fixed to the upper pipe embraces and forms a guide for the upper horizontal member of the lever. An operating shaft extends parallel to the roadway and is supported by posts. A crank-arm on the shaft near the gate post is connected by a link with the upper end of the latch-operating lever on the gate.

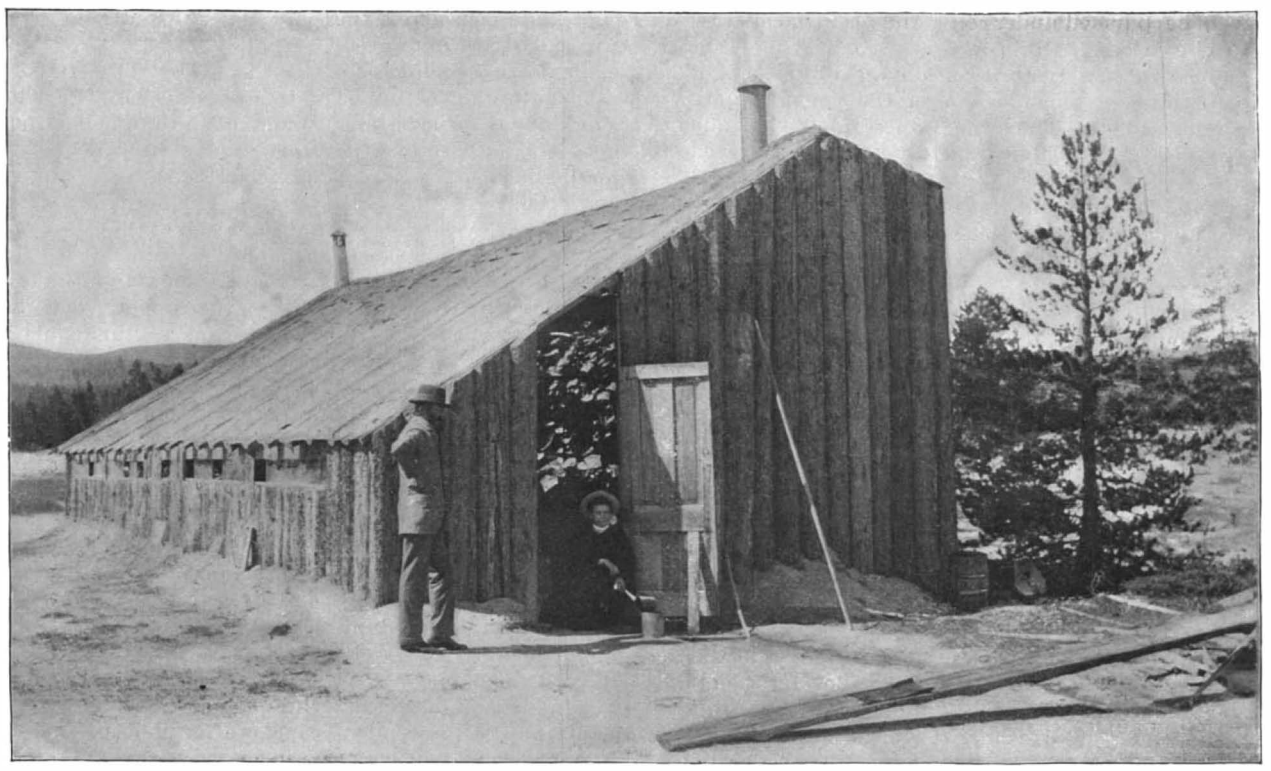
When the gate is closed, the operating handles attached to the end of the shaft are in the position shown in the illustration. If one of these handles be pulled down, then the central crank-arm acts on the latch-operating mechanism described and unlocks and opens the gate. Having driven on until the next shaft-operating lever is reached, the person seated in the carriage pushes this handle up to close and lock the gate. The gate has been patented by Theodore Sawyer, of Towanda, Ill.



SAWYER'S SELF-OPENING GATE.

GARDENING OVER A GEYSER.

Mr. W. P. Howe, of Upper Geyser Basin, Yellowstone Park, Cal., has a unique hothouse. It is constructed of rough slabs of wood, as shown in our engraving. The greenhouse measures 25 by 50 feet and is covered with a glass roof. The building faces the east; the front is four feet high and the rear is eighteen feet high. The heat is furnished by hot water from a five-inch orifice in the ground at the south end of the building; it then flows north to the center of the building. The water comes from the ground at a temperature of 195° F. at its exit from the geyser. Its temperature at this altitude is within 8° of boiling point, for the hothouse is 7,394 feet above the sea level. It is astonishing that such splendid garden products can be grown at such a height, for ice forms nearly every month in the year, and the mercury in winter is exceedingly low. Five-foot beds surround the building on the inside, except at the north end, which has a nine-foot bed in the center. All the beds are raised from eighteen inches to two feet for circulation and to afford a place for the growing of mushrooms. An aisle runs around the room between the beds. The result of this high temperature is wonderful. The beds are filled about three feet deep with rich stable refuse mixed with one-third silica formation from near by. The rich soil, the sun's light, and the condensation of steam from the hot water, makes an ideal combination for the growth of vegetation. Lettuce, it is said, comes up from the dry seed in two days and good sized heads of lettuce were gathered in from fifteen to eighteen days after planting. In twenty-eight days a head of lettuce measured twenty-two inches across, and the condensation of the steam would even break down the larger leaves with the weight of water upon them. Cucumber vines grow from twenty-five to thirty-five feet in length in less than sixty days, without being watered, except for the moisture in the air. On some of the cucumber vines, five full sized cucumbers were gathered from a single joint. Three pails of water have been sufficient for watering the plants in the greenhouse on even the hottest day. This greenhouse, or hothouse, as it should more properly be called, is an interesting utilization of the forces of nature which would otherwise run to waste.



A GREENHOUSE HEATED BY THE NATURAL HEAT OF A GEYSER IN YELLOWSTONE PARK.

The Effects of Change of Climate upon Man and Animals.

The problems of the relations of climate to the health of man are varied and complicated. That environment does exercise a very strong influence on race is universally allowed, although we are still greatly in the dark as to its effects on the human organization. Much light has been brought to bear on the subject of climatology within recent years. It has been intelligently studied, and, in consequence, a more accurate knowledge is spreading of the influence of climate in regard to health and disease. Especially is this the case in relation to disease. Change of air is often as curious as it is beneficial in its effects. Extreme purity is naturally an important factor, but after all it is but one factor. In many instances it is by no means essential that a patient should go to the seaside or even to the country in search of health. A change in itself is often of the greatest benefit. It is related on good authority that a man suffering from asthma and bronchitis, who lived in a healthy part of the country, found great relief by residing for a time in the slums of Whitechapel. Change of climate has an even more powerful effect on animals than on man; in fact, man is the only animal that can adapt himself to any circumstance of life or meet any environment. Dr. Richard Newton, in a paper read before the American Climatological Society, gives the results of his observations on the effects of climate on men and animals at Fort Stanton, N. Mex., sixty-one hundred and fifty feet above sea level. His opportunities for study were limited, but, as he remarks: "The great need in the study of climatology at the present moment appears to be more investigation of individual cases, more ascertained and established facts in relation to the action of climatic changes upon people or animals." He describes the effect of the change of climate upon the fever-stricken Texan cattle, and points out that if they survive the winter, and when the disease germs are killed by the frost, they soon wonderfully improve and increase in weight. Horses suffer acutely when brought from the plains to high altitudes, and it is stated that it takes twelve months or even longer for them to become acclimatized. Dogs, as is well known, endure climatic changes better than any animal except man.

Dr. Newton's deductions as to the effect of change of climate on man agree in the main with those of other observers. He disagrees, however, with the view held by Dr. Solly, that high altitudes are inimical to rheumatism; his experience teaches the reverse. No one will dispute the point that change of climate is of benefit in phthisis, yet climate treatment of this disease is beset with many difficulties and needs to be applied with much discrimination. The rule may be laid down as one to be followed in most cases, that in the early stages of phthisis a sea voyage or journey to a distant clime will do good, but that when the progress of the disease is far advanced, if a change be taken at all, it should be limited. The fact, too, should not be forgotten that one of the most important desiderata for consumptive invalids is plenty of sunshine. The causes for the health-giving properties of a change of air are obscure; at any rate, up to the present they have not been satisfactorily explained. A biological solution of the problem is sometimes suggested, that as early man was of necessity a wanderer, these nomadic habits have left their impression upon every cell and fiber of his being, and thus it is largely a question of heredity.—Med. Record.

A Rubber Substitute from Corn.

We have received a sample of a rubber substitute made from corn. It is made from the oil derived from corn, and by vulcanizing it in connection with an equal quantity of crude India rubber, a substitute is produced which, for certain purposes, is equal to the best gum rubber at a greatly lessened cost. The new corn rubber is claimed to possess all the essential qualities of Para rubber, including resiliency, and the discovery has been hailed with delight in the corn-growing States of the West. The manufacturers claim that the fact that corn oil does not oxidize readily makes this product of great value, since it is not affected by oxidation, so that products manufactured from it will always remain pliable and not crack as those made from other substitutes. This interesting substitute for rubber is very dark brown or black and it easily rubs off in light brown rolls. It is at present sold as low as six cents a pound. It is manufactured by the Glucose Sugar Refining Company, of Chicago, Ill.

Cinchona from West Africa.

The cultivation of cinchona in Portuguese West Africa was commenced more than thirty years ago with the planting of Cinchona paludiana. Between 1869 and 1871 a number of plants of C. succirubra and C. officinalis were given out by the botanic gardens in Coimbra, and from time to time the gardens have assisted in extending the cultivation of various species, so that by the end of 1887 1,600,000 cinchona trees, mostly C. succirubra, were flourishing. The best bark is obtained from trees growing at an altitude of 3,300 feet. Lisbon takes nearly all the bark produced for the manufacture of quinine.—Chemist and Druggist.

[It may here be remarked that cinchonas of different varieties, and even many profitable hybrids, are cultivated in Jamaica, Java, Sumatra, India and the French East Indies. Systematic cultivation is also being undertaken in Ecuador, Peru and Brazil.—ED.]

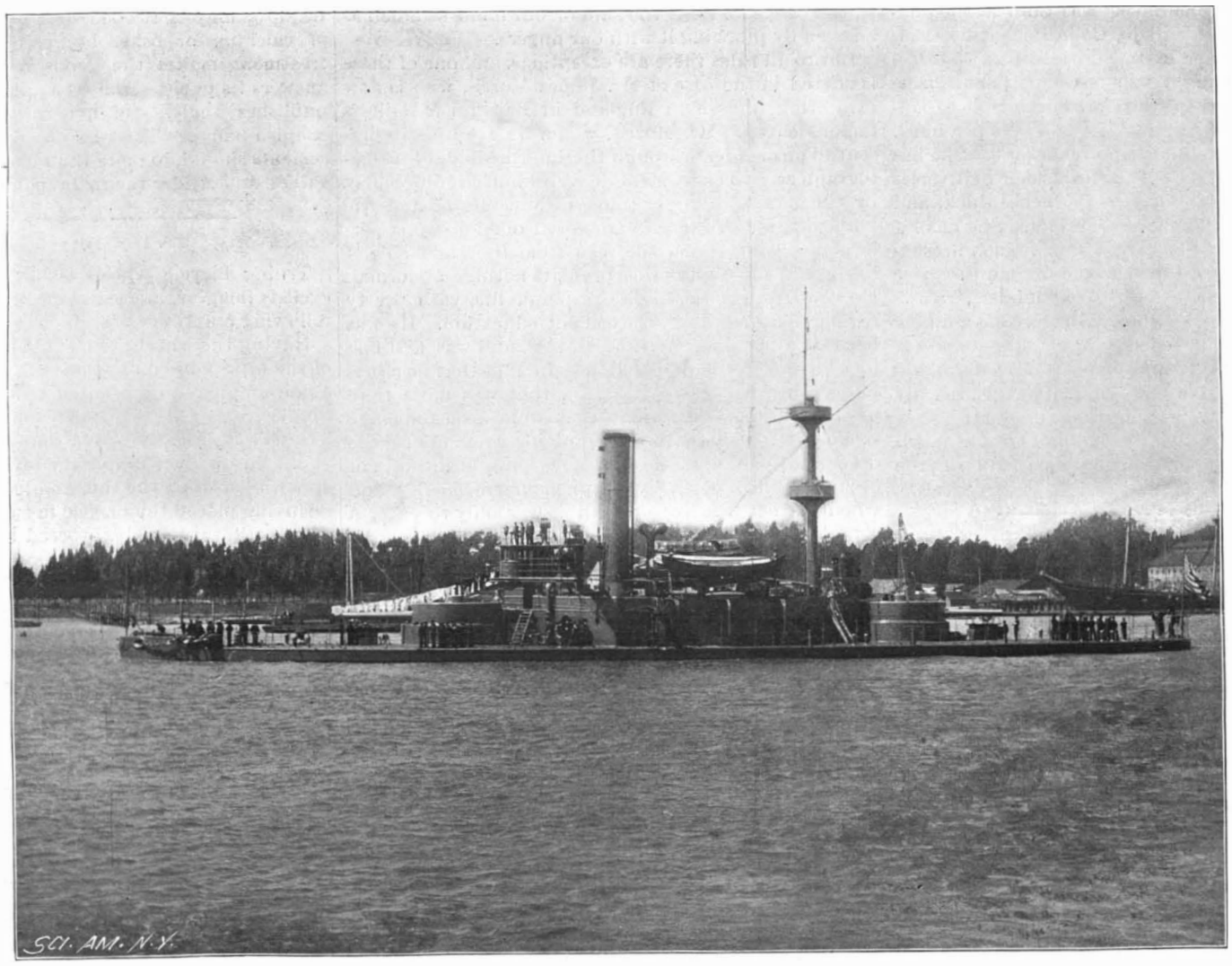
© 1898 SCIENTIFIC AMERICAN, INC.

REINFORCEMENT OF THE DEWEY SQUADRON.

After the brilliant naval action of Manila Bay on May 1, it was decided to reinforce Dewey's squadron, so that the substantial fruits of his victory would be assured to him and all danger of his being assailed by a superior force would be eliminated. It was also considered desirable to send an army of occupation which should take formal possession of Manila as the key to the Philippine Islands, for Dewey's squadron only had a sufficient complement of men to properly man his vessels, and any landing of the marines would have been attended with danger, as they would have been immensely outnumbered by the Spanish troops. Notwithstanding the fact that every effort was made to rush forward preparations for the embarkation of troops, it was not until May 22 that the cruiser "Charleston" started westward with a full supply of ammunition and provisions for the squadron. The "Bennington," which was at Honolulu, was ordered to Manila, and the "Mohican" left San Francisco June 5 to relieve the "Bennington." Three large transports left San Francisco on May 25 with 2,600 troops and supplies of food and ammunition. Major-General Wesley Merritt was made military commander of the Philippine Islands under the title of Governor-General, and has had 21,000 troops assigned for service in the Archipelago, and General Merritt himself sailed on June 30 with the Astor Battery and other troops.

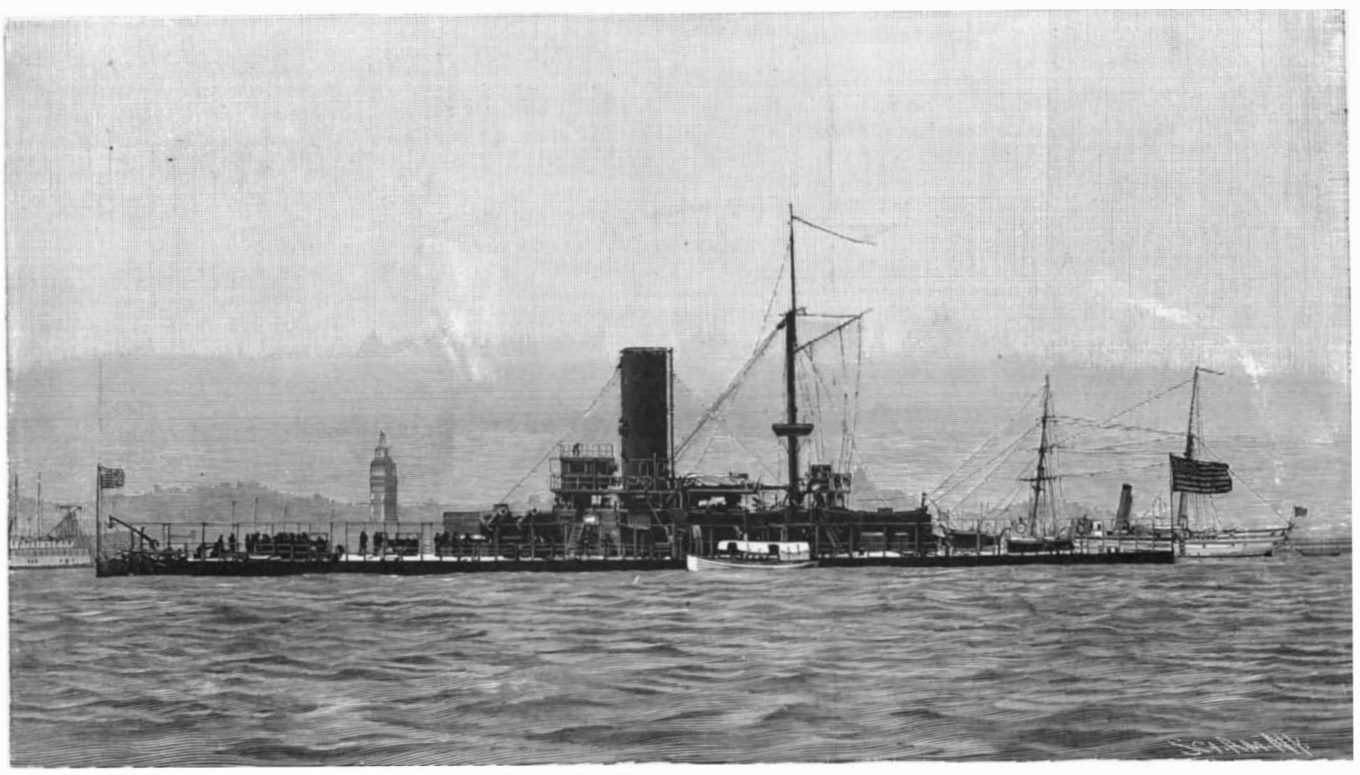
The question of strengthening the Dewey squadron was an interesting and important one. There was not a great choice in the matter, as the "Oregon" had been sent to join the fleet in the Atlantic. The protected cruiser "Charleston" is a fine boat of 3,730 tons displacement and capable of making 18½ knots per hour. She has a 2 to 3-inch protective deck, and the main armament consists of two 8-inch and six 6-inch breech-loading rifles. It was decided that it would be desirable to provide vessels better protected and more heavily armed, so the monitor "Monterey" and the coast defense monitor "Monadnock" were selected for the service.

The distance from San Francisco to Manila by way of Honolulu is 7,000 miles; and as the "Monterey" has a normal coal capacity of only 200 tons, the "Monadnock" only 250 tons, it was a bold venture to send away these monitors, which were built for coast defense. No monitor had ever taken such a voyage, and naturally the greatest interest is felt in naval circles over their trip, the question of coal making it of great importance. A few years ago the "Monterey" made a run down the Pacific coast from San Francisco to Callao, Peru, stopping frequently on the way to coal. The "Monterey," in her trip to Callao, traveled more than 1,800 knots without stopping to coal. The best speed of the "Monterey" is 13·6 knots per hour, but as she will have to economize in coal on this voyage, she will not make more than 8 knots. Coaling at sea is a dangerous and tedious performance, and much time will be lost in conveying the fuel from the collier to the bunkers and deck of the "Monterey." It is estimated that in the run from Honolulu to Hong Kong, 4,961 miles, she will have to coal four times at sea, and on her trip from San Francisco to Honolulu the "Monterey" will be towed by an ocean-going tug after the coal gives out, to avoid the necessity of taking on coal at sea. At Honolulu the consorts as well as the monitor will fill their bunkers, and this will be repeated at Hong Kong. The "Monterey" and the collier "Brutus" sailed at noon on June 6 from San Francisco and put in at San Diego on June 10. The "Monterey" had 200 tons of coal on her deck. When one day out from San Francisco, 80 tons of it were washed away. She was so heavily loaded that she lay very low in the water, and the sea sweeps over her even when she is under way and in smooth water. She took on additional coal and proceeded with her voyage. The "Monadnock" sailed on June 23 from San Francisco for Manila. She has sufficient coal to carry her to Honolulu, and she will make that port under her own steam. She has aboard 360 tons besides more than 100 tons on her deck. From Honolulu the "Nero" will tow her to Manila, the best appliances for that purpose having been put on both vessels. The collier has at least 5,000 tons of coal.



THE COAST DEFENSE MONITOR "MONADNOCK" STARTING FOR MANILA.

When the two monitors and the "Charleston" have reached their destination, Acting Rear-Admiral Dewey will have a formidable addition to his squadron, for the cruisers and the gunboats which participated in the notable battle of Manila Bay are only protected, and the "Olympia" alone has a turrret. With the "Monterey," "Monadnock" and the "Charleston" Admiral Dewey will have nine fighting ships under his command, not including the revenue cutter "McCulloch," which is being used as a dispatch boat, so that even if Spain should send her Cadiz fleet, which has now reached the Suez Canal, to Manila, Admiral Dewey will have a formidable squadron with which to meet the enemy. Having now given an outline of the proposed measures to reinforce Acting Rear-Admiral Dewey, we will briefly note a few particulars regarding the monitors which are sent to reinforce him. At the time when it was finally decided to complete the four old monitors whose keels were laid in 1874, the construction of a new monitor, the "Monterey," was authorized. The contract was secured by the Union Iron Works, of San Francisco, who are also the builders of the battleship "Oregon." The keel was laid in 1889, and the vessel went into commission February 13, 1893. This vessel is a good example of a monitor pure and simple, and is one of the most powerful coast defense vessels of the new navy. Her length is 256 feet; beam, 59 feet; draught, 14 feet 10 inches; her displacement is 4,138 tons. She is constructed entirely of steel, the belt being 13 inches thick amidships, tapering to 8 inches at the bow and 6 inches at the stern. A continuous deck of 3 inches of steel extends from stem to stern. Further protection is provided by a double bottom and water-tight bulkheads. The hull contains 110 watertight compartments. The heavy guns are carried in turrets and the turning gear, etc., is protected by barbettes. The forward turret is 8 inches thick and the barbette 12 inches thick, and within the turret are two 12-inch guns. The after turret is 7½ inches thick and the barbette 11½ inches, and the heavy guns are 10-inch breech-loading rifles. The ship carries a single military



THE MONITOR "MONTEREY" EN ROUTE FOR MANILA.

© 1898 SCIENTIFIC AMERICAN, INC.

mast in the fighting top, in which is placed a part of the rapid-fire batteries, which consist of six 6-pounders, four 1-pounders and two machine guns. Her engines, which are illustrated on page 31 of our NAVY SUPPLEMENT, are of 5,244 horse power.

The "Monadnock" is the sister ship to the "Miantonomoh," "Amphitrite" and "Terror," although these vessels differ somewhat as regards their engines, speed and armor. The "Monadnock" was built at the Continental Iron Works, of Vallejo, California. She is 259 feet 6 inches long; her extreme breadth is 55 feet 6 inches; her mean draught is 14 feet 6 inches; displacement is 3,990 tons; she has twin horizontal triple expansion engines, which drive her at 12 knots per hour. Her maximum indicated horse power is 3,000. She has two steel barbette turrets. The steel armor belt varies from 5 to 9 inches. Her turret is 7½ inches thick, and her barbettes have 11½ inches of armor. She has 1¾ inch protective deck. She carries four 10-inch breech-loading rifles and two 4-inch rapid-fire guns. Her secondary battery consists of two 6-pounders, two 3-pounders and four smaller guns. She has one military mast. Her complement consists of 26 officers and 157 men. The "Terror," "Amphitrite," and "Miantonomoh," which all resemble the "Monadnock," are fully illustrated in our NAVY SUPPLEMENT.

Our engravings were made from photographs taken at San Francisco just before the departure of the monitors.

Krypton.

On June 6, 1898, the discovery of yet another element was announced, in a communication made by Prof. Ramsay, of London, to the Academy of Sciences, of Paris. The communication was read to the Academy by M. Berthelot. This new element is a gas, and makes a fifth constituent of the atmosphere; it is, however, present in very minute quantities, viz., one part in ten thousand of its volume. Krypton belongs not to the argon, but the helium group; its density is greater than that of nitrogen, being, according to the corrected measurement, 22·47.

The discovery of this new gas is in a way due to the kindness of Dr. Hampson, who supplied Prof. Ramsay with about 750 cubic centimeters of liquid air; this was allowed to evaporate away slowly, until not more than 10 cubic centimeters were left. This gaseous residue was freed from oxygen and nitrogen, and then sparked in the presence of oxygen and caustic soda, when a spectrum was obtained showing the argon lines feebly, but in addition to this a new spectrum was observed.

This spectrum is not yet entirely disentangled from the spectrum of argon: it is, however, characterized by two very brilliant lines, one almost identical with D_3, and another one very strong in the green.

Measurements made with a grating of 14,438 lines to the inch give:

$$D_1 = 5895{\cdot}0$$
$$D_2 = 5889{\cdot}0$$
$$D_3 = 5875{\cdot}9$$
$$D_4 = 5867{\cdot}7$$

The green line, which is comparable with the helium line in intensity, has the wave length 5568·8, and the somewhat weaker line which accompanies it has the wave length 5560·6.

The wave length of sound was determined in the gas by the method described in the "Argon" paper. The data are:

	I.	II.	III.
Wave length in air	34·17	34·30	34·57
" " in gas	29·87	30·13	..

Calculating by the formula:

λ_2 air × density air : λ_2 gas × density gas :: γ air : γ gas

$(34{\cdot}33)^2 \times 14{\cdot}479 : (30)^2 \times 22{\cdot}47 :: 1{\cdot}408 : 1{\cdot}666$

it is seen that, like argon and helium, the new gas is monatomic, and, therefore, an element.

The atomic weight of krypton will probably be found to be 80.—Chemical News.

Kussu Honey.

The Pharmaceutische Post is responsible for the statement that King Menelik, of Abyssinia, made an experiment to determine whether honey made from kussu flowers (Brayera anthelmintica) could be used as a tænicide. He planted numerous Brayera trees in his garden, and at the flowering season placed several hives of bees close by. After the honey had been stored a test was made. It was proved that a tablespoonful of honey dissolved in water speedily caused the expulsion of tapeworm.

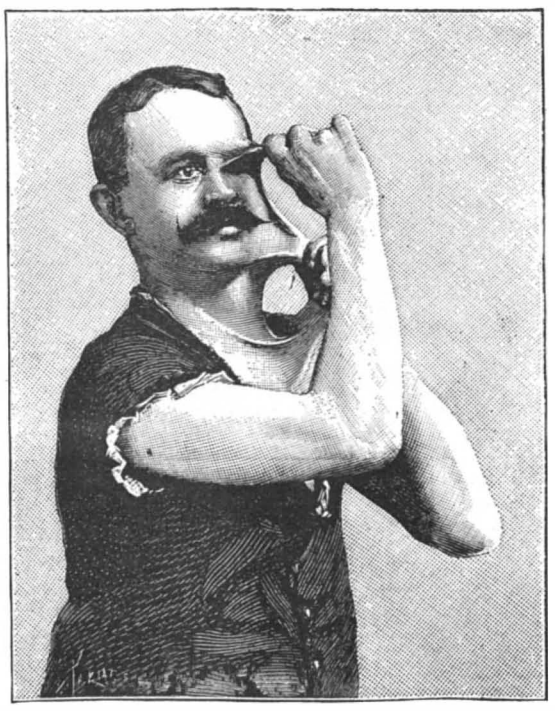
The Quinine Industry in Germany.

During the ten years 1887–1896 Germany imported cinchona bark to the value of 35,500,000 marks, while her exports thereof were only 2,000,000 marks. Her exports, however, in quinine and quinine salts reached the enormous total of 58,000,000 marks, of which the greater part was to the United States. Russia, Italy and Holland absorb large quantities also. The imported quinine totalled, during the decade in question, 2,100,000 marks.—Süddeutsche Apotheker Zeitung.

MORRIS, THE "INDIA RUBBER MAN."

Oxen, horses, cats, dogs and many other animals have the peculiarity (fortunate from certain points of view) of possessing an extremely elastic skin, which almost floats, so to speak, around the tissues that it envelops, and which may be easily stretched without the animal experiencing any painful sensation. This is a faculty that does not belong to us poor human beings, who are scarcely able to raise the skin of our hand as much as an inch by pinching it with our fingers.

But to all rules there are exceptions, and one of these is offered in the case of Mr. James Morris, who is now exhibiting himself in England in Barnum & Bailey's famous circus. Mr. Morris, whom we are able to present to our readers through the intermedium of a photograph sent to us by Mr. Bailey, is known indifferently by the names of the "India Rubber Man" and the "Elastic Skin Wonder." Observed outside of his performance (and as may be seen from the right side of his face in the picture), he presents nothing abnormal. He is a strong man, in the prime of life, with pretty regular features and an excellent education. He was born at Copenhagen, N. Y., in 1859, and was first employed in a cotton mill. It was in 1873 that he ascertained that he possessed a skin that was more than usually elastic. He was at that time accustomed to stretch it for the amusement of his companions (the other lads employed in the same mill), but it did not occur to him to profit by his phenomenal faculty, and when he left the cotton mill it was only to enter a rope-walk in the State of Rhode Island, which he finally forsook for military service. Here he gave representations to his regimental comrades. The officers soon got wind of the thing, and wishing to witness



JAMES MORRIS, THE "INDIA RUBBER MAN."

the phenomenon, got up an exhibition to which they invited some friends and journalists.

The manager of the Westminster Museum learned of the existence of the man with the elastic skin, and succeeded in engaging him for a year. Since then, having found his vocation, Morris has traveled around the country drawing profit from his "elastic skin," as the posters call it. For the last fourteen years he has exhibited himself almost everywhere in the United States and Canada, and has now come to visit the old world, or at least to show himself thereto.

The spectacle that he gives cannot be truly considered as pleasing; and from this point of view the reproduction of the photograph that we present herewith will prove more eloquent than anything that we might say. He stretches the skin of his forehead, cheeks and breast in a truly fantastic manner; and does the same with the skin of his nose, which, according to the picturesque language of a spectator, then takes on the aspect of an elephant's trunk.

Apropos of this singular plasticity with which Morris' face is endowed, we may recall the very singular example mentioned by M. Albert Tissandier in the account of one of his interesting voyages around the world. It was a question of the Japanese grimacer Morimoto, who succeeded in raising his lower lips and chin so as to cause the end of his nose to disappear, and who concealed his mouth in the folds of his cheeks. —La Nature.

THE fine red color of certain rubber goods often turns into a nondescript white much to the disappointment of the shopkeeper, who is anxious to show goods of perfect finish. A writer in the Gummi Zeitung offers a few useful hints on the manner in which the red color may be maintained. The white is due, in the first instance, to French chalk, which does not show much as long as the goods are not perfectly dry, and which may easily be removed by wiping with naphtha. The other cause of trouble is the sulphur, which slowly makes its appearance on the surface after weeks. The sulphur can be got rid of by boiling the article in five per cent caustic soda; many articles will not stand such treatment, however. Rubbing with cotton waste soaked in naphtha is again said to be useful. Goods which have to be exposed in shop windows may be rubbed with glycerine, soap, chloride of calcium, or other hygroscopic substances. The treatment makes the goods rather slippery, but it answers its purpose. In the same issue Dr. Treumann publishes analyses of five rubber cements, all with English names. The analyses do not show why those cements should do more than clog the pneumatics and valves and render the real repair difficult.

Truing Bicycle Wheels.

Truing bicycle wheels is not so difficult as many cyclists imagine, and can be easily accomplished if the following points are observed:

Having the wheel sideways toward you, holding one of the top spokes on the side of wheel next to you with a pair of pliers to prevent it twisting, and turning the nipple so that its side next you moves from right to left, will tighten the spoke and draw rim over toward you. Turning the nipple the reverse way will have an opposite effect on the rim, and loosen the spoke.

Having placed the bicycle in such a position that the wheels will turn freely, proceed as follows: Take hold of the front forks, or rear stays, as the case may be, with the fingers, close to the rim of wheel you wish to true up, and hold the thumb (or a piece of chalk) stationary, in such a position that the edge of rim will touch it in places when the wheel is revolved. Revolve the wheel slowly and notice where the rim touches the chalk; then tighten spokes on the opposite side at that place, if spokes are slack; should they be tight (which is rarely the case), loosen those on the side where the chalk mark is. A quarter to half a turn of the nipples is generally sufficient. Now, revolve wheel slowly and repeat the above operation at every "high" place in rim, i. e., every place that touches the chalk.

Of course, should the rim touch all the way round except in one place, you will tighten the spokes on the side next you at the place where it does not touch.

In tightening or loosening spokes, hold them with a pair of pliers close up to the nipple and turn nipple with a nipple wrench placed firmly upon it. The most convenient nipple wrenches the writer has seen are concave disks with milled edges, having a slightly V shaped slot running from the edge to a little past the center.

Having trued the rim so far, i. e., made it so that the edge keeps in contact with the chalk when the wheel is revolved a full revolution, the next operation is to get the rim concentric. To do this, see that the frame is firm and steady, sight some object on the opposite side of the rim a little distance away from it and in a line with the inside of rim and your eye and revolve the wheel slowly; at the places where the rim looks to be nearest the hub, loosen the spokes on both sides equally, and where the rim is farthest away from the hub, tighten the spokes on both sides equally. Repeat the operation until the rim is a circle with the hub in the center.

The rim is now true, but it is most important that it should be central with the hub sideways. If it is not, the bicycle will not steer properly. To find out if the rim is central, thread a piece of strong cotton thread over the tire, between the spokes and as close to the barrel of hub as possible without touching either spokes or hub (when thread is tight) to a point on rim nearly diametrically opposite the place from whence you started; take cotton over the tire and thread between spokes on opposite side back to the starting point, then tie the two ends of thread together over the tire; place a pair of trouser guards, or pieces of metal bent to a similar shape, over the tires so that the ends of them press the cotton close to edge of rim at the sides.

See that the thread touches neither the hub nor any of the spokes, and with a pair of dividers measure the distance from the cotton to the outside flange of hub on one side; with the dividers set to this distance, measure the opposite side; if both measurements are the same, then the wheel is true. If one side measures less than the other, loosen all the spokes equally on the side that measures less, and then tighten all the spokes equally on the side that measures more. An eighth or quarter of a turn is usually sufficient, unless the rim is very badly out. A very slight adjustment of the nipples makes a surprising difference to the rim in this last operation; in turning the nipples be careful to do so equally, i. e., if you loosen the first one one-eighth of a turn, loosen all the others on that side one-eighth of a turn and then tighten all those on the opposite side the same amount. It is best to start at the valve, and you then know where to stop.

If the wheel is true at first and the spokes simply want tightening, all you have to do is to tighten all the spokes equally.—L. A. W. Bulletin.

© 1898 SCIENTIFIC AMERICAN, INC.

THE MANUFACTURE OF PINTSCH GAS.

History tells us that the first recorded instance of the lighting of railway cars occurred on a tram line, owned by the Stockton and Darlington Company, which ran between Darlington and Sheldon, England. The company boasted of a single coach, built by the great Stephenson in the year 1825, which was drawn by a single horse over iron rails between the places named. The "Experiment," as this forerunner of the Pullman vestibule was called, was a very modest and somewhat uncouth machine, which resembled—so says the historian—the caravans which were yet to be seen at county fairs containing the great "Giant and Dwarf" and other wonders of the world. A row of seats ran along each side, and a long table was fixed in the center, access being had by a door at the back end. It seems that to one Thomas Dixon, the driver of the "Experiment," belongs the credit of being the inventor of car lighting on the rail; for on dark winter nights, having compassion on the passengers, he would buy a penny candle and place it lighted among them on the rough board which answered the purpose of a table.

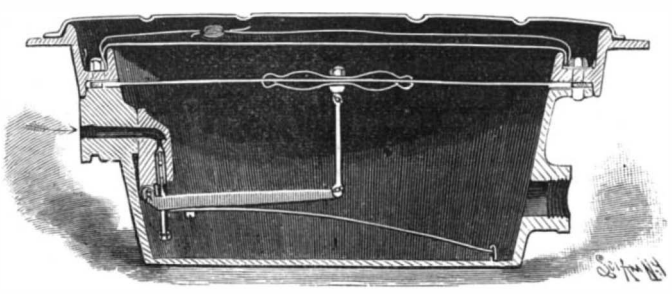
From the sputtering candle which made darkness visible on the "Experiment" to the brilliant Pintsch gas light of a luxurious modern railroad car is a far cry; and if space permitted, it would furnish an interesting story to follow the growth of car lighting through the intervening three-quarters of a century. Confining ourselves to the present subject, however, we must be content to state that Pintsch gas is so named after its inventor, Julius Pintsch, of Berlin, who, realizing the urgent necessity for a better method of lighting than by the oil lamp or the tallow candle, which was even in his day in use in some parts of Europe, invented his justly famous system of car lighting by gas. Briefly stated, Pintsch gas is a fixed gas manufactured from naphtha, which, after being thoroughly purified, is compressed into storage tanks, and from them drawn off through an automatic regulator, which reduces it to the pressure of one-third of an ounce per square inch, at which it is used at the burners.

The gas was designed specially for the illumination of railroad cars; and while it has found a useful field in other directions, notably in the illumination of buoys and beacons, where its capacity for storage and its ability to stand rough usage without going out, render it extremely valuable, it is in car lighting that it has found, and is ever likely to find, its most successful application.

We present in this issue illustrations of a typical Pintsch gaslight plant as installed at New Haven, Conn., for supplying the cars of the New York, New Haven and Hartford Railroad. The plant consists of retorts for the distillation of the oil, purifiers, compressors, storage tanks and gas mains to lead the gas to the station platforms at which the storage tanks on the cars are charged. It should be explained that the general view of the plant varies in minor details from the plant as it actually exists, the relative position of the various parts having been rearranged somewhat, and the number of parts reduced, so as to place each step of the process clearly before the reader.

The oil from which the gas is made is known as "distillate," and is purer than the commercial naphtha. It is brought to the works on the company's cars in casks, and is run by gravity into three cylindrical storage tanks, whose combined capacity is 14,000 gallons. From these the oil runs through a pipe, which is provided with a check-valve, into a small cylindrical tank from which it is raised by pneumatic pressure to another tank of about 50 gallons capacity, located above the retorts. When the lower tank is full, the Westinghouse air pump is started, and the air, which is led in above the liquid, forces the latter out through the pipe which will be noticed leading from the bottom of the tank, and up to the tank above the retorts. The retorts are arranged in sets of four, two upper and two lower, with a fire below each set, and there are eight fires in all. The cast iron retorts are about 10 inches in diameter, with a 1½-inch shell. Each retort is connected with the one above it by a double bonnet at the front end. The rear end of the upper retort is closed by a cover through which the oil is led by means of a small pipe. The lower retort leads into the "hydraulic main," by which the products of distillation are carried away for further treatment. The covers are taken off when it becomes necessary to clean the retorts and remove the deposits which gather on the inside of the shell. If the deposit is soft, it is cut away with a chisel bar, but if it is hard, it is burnt off by admitting a draught of air or by allowing a jet of steam to play upon it. The joints are sealed hermetically with lime to prevent the escape of the gas.

From the 50-gallon tank the oil is led by a small pipe into the upper retort, and spreads in a thin layer over a sheet iron tray, where it is vaporized by the heat of the furnace. The gas is prevented from returning by placing a suitable trap in the oil feed-pipe, and the flow of the oil is regulated by means of a micrometer screw which permits of varying the supply according to the temperature. The distillation of the oil which commences in the upper retort is completed in the lower one, where the heat is greatest. The gas passes from the retorts to a stand-pipe, which terminates in a sealing cistern of water at the bottom of the hydraulic main, the latter serving to prevent the escape of gas. The water is kept in constant circulation, being fed by a water pipe which runs above the retorts, and flowing out into the "tar trap" together with the gas and a small amount of tar which has been condensed in the cistern. The tar trap is a square iron box in which much of the tar, together with the overflow water from the cistern, is collected. From this the tar and water flow by gravity into a seal pot, which is shown in the illustration, sunk in the ground to the left of the tar trap. This is simply a cylindrical vessel filled with water, the pipe from the tar pot being carried down and opening into the vessel near the bottom. The arrangement seals the apparatus against the passage of the gas, while at the same time allowing the liquids to pass away.



REGULATOR FOR CONTROLLING PRESSURE AT THE BURNERS.

An 8-inch pipe conducts the gas to a large condenser, located on the floor above. This is similar in construction to an ordinary tubular boiler. It has a chamber at each end, connected by a number of 3-inch tubes, around which cold water is kept constantly circulating. As the gas travels through the tubes it is cooled, and the moisture, together with the remainder of the tar, is condensed, collecting in the lower chamber, from which it drains into a drip-pot located on the lower floor. From the condenser the gas passes into the washer. It enters through a vertical 6-inch pipe, the top of which is covered by a hood, which dips one inch below the surface of the water and below a horizontal perforated screen. The gas is thus caused to pass through the water in innumerable fine streams, with the result that it is freed from impurities, which consist chiefly of the heavy and ungasified portions of the oil, that are not removed by cooling and are carried thus far in the process. The gas is next led to the purifier, a rectangular iron box containing a number of perforated trays, on which is spread a layer of wood chips and shavings covered with slaked lime. The shavings are placed there to keep the lime loose and prevent its packing down upon the trays. The gas enters at the bottom and, in passing up through the lime, it is relieved of its sulphur. It is then led through a meter capable of registering 100,000,000 cubic feet, and it finally enters the gasometer. Both the inlet and outlet pipes of the gasometer are provided with "drips" to catch the moisture that may be precipitated.

From the gasometer the gas is drawn by a 2-inch pipe through the "freezer," a plain cylindrical vessel, to the compressors. The freezer is connected directly with the suction of the compressors, and the rarefaction of the gas, by further lowering its temperature, condenses the moisture and dries the gas; hence the freezer is also known as the drier. The compression is done by the three single-stage compressors shown in the illustration. It will be noticed that connection is made from the compressors to both the inlet and outlet of the gas tank. This is done to provide for any emergency, such as the failure or repair of the tank, in case of which the gas could be drawn direct from the meter.

The gas is compressed to 14 atmospheres and stored in a stack of accumulators—steel cylinders, 20 feet in length, from which it is drawn off for use as required. Before entering the accumulators, however, the gas passes through a hydrocarbon tank, in the bottom of which the hydrocarbon is deposited. A certain amount of hydrocarbon is also deposited at the bottom of the accumulators, and a series of small ⅜-inch pipes lead from them and from the bottom of the hydrocarbon tank to a storage tank on the upper floor, to which the hydrocarbon is forced by the pressure of the gas.

The gas is conducted from the accumulators by three 2-inch mains to the platforms of the New Haven station, where there are 33 filling valves, each of which is provided with 35 feet of hose and the necessary couplings to connect with the storage cylinders underneath the cars. The gas in these cylinders is under a pressure of 10 to 12 atmospheres, and before it can be used at the burners the pressure has to be reduced to about an ounce. This is accomplished by passing it through a regulator placed beneath the car. The details of the regulator are shown in the accompanying sectional view. The gas enters, as indicated by the arrow, by a small valve, the stem of which acts upon a lever controlled by the pressure of a steel spring. The top of the receiver is closed by a flexible airtight leather diaphragm, which is connected by a vertical rod to the long arm of the lever just mentioned. When the gas exceeds a certain pressure, it lifts the diaphragm, thereby raising the lever and closing the inlet valve. From the regulator the gas passes to the burners at the roof of the car, where it is controlled in the usual manner.

PINTSCH GAS APPLIED TO RAILROAD CARS—SHOWING STORAGE CYLINDER, REGULATOR AND BURNERS.

When it is compressed the oil gas possesses an illuminating power six times greater than that of city gas. The value of the gas for the special purposes to which it is put consists mainly in the fact that, while coal gas loses the greater part of its illuminating power by compression, oil gas loses only one-eighth. It is this quality that renders the Pintsch gas eminently adapted for car lighting and for use in buoys and beacons, or where it is subject to unusually rough usage.

DRURY Lane Theater has the largest fireproof curtain in the world. It is 42 feet by 30½ feet, made of iron and asbestos, and in case of fire can lower itself automatically in fifteen seconds.

© 1898 SCIENTIFIC AMERICAN, INC.

The Acetylene Gas Hazard.

The National Board of Fire Underwriters, at its recent annual meeting, approved a set of rules for governing the acetylene gas hazard, because of the attempts to introduce acetylene gas as an illuminant in various parts of the country. These rules are based upon a special investigation of the gas by Prof. Henry Morton, of the Stevens Institute of Technology, undertaken at the request of the National Board.

The special sub-committee of the board, in its report upon the work of Prof. Morton, stated that there was a growing demand from department stores and other general stores, where bicycles or bicycle sundries are dealt in, for permits to keep and sell calcium carbide and portable lamps for its use.

Acetylene gas is produced by the action of calcium carbide on water, and is rapidly coming into use for illuminating purposes. Various bodies of insurance men have attempted to control the conditions of its installation, on account of its great instability and tendency to cause destructive explosions.

The rules adopted by the National Board last week for its regulation will now be referred to the several associations throughout the country, with the hope of obtaining a uniform standard.

The more important of these new requirements for the installation and use of acetylene gas are as follows:

The generating and gas-holding apparatus, when installed for lighting buildings in the closely built-up portions of towns and cities, must be situated in an outside, fire-proof, and well ventilated building.

All generating apparatus should be in charge of persons properly instructed in their management.

No artificial light should be used inside of the building in which the gas is generated, and no heat except steam.

Bicycle and other portable lamps, in which acetylene gas is generated and supplied direct to burners, should not be approved until such lamps are so constructed that they will cease to generate gas immediately upon the extinguishment of the flame.

The storage of liquid acetylene in any building, or the use of liquid acetylene gas, should be absolutely prohibited.

In regard to the construction of the generator and gasholder, it is recommended that only wrought iron or steel, capable of resisting an internal pressure of twenty pounds to the square inch, should be used, and under no circumstances should copper or any alloy containing copper, such as brass or bronze, be employed, since acetylene sometimes forms a compound with copper with great violence when heated or struck.

It is also recommended that the generator be so designed that it can be supplied with calcium carbide, and the residuum withdrawn without the escape of gas or the admission of air, in order to insure the prevention of dangerous explosive admixtures of air with the gas in the generator.

Technical Education in Germany and America.

The war upon which we have entered will change, has indeed already changed, our relations to foreign countries. We shall undoubtedly be drawn more deeply into the stream of competition with respect to the arts of peace. It is difficult for us to realize how much these depend upon the system of public education, nor how deficient we are in provision for certain lines of scientific and technical training which are essential to their full development. This is a lesson that England has learned on her part, through the sudden rise of German manufactures, and the lesson that Germany learned in view of the artistic superiority of her French competitor. It is evident that Germany intends to excel in manufactures, as she has in arms, and she goes about it with the same masterful thoroughness. A recent deputation from Manchester to investigate the technical schools of Germany, reports extraordinary development in electrical sciences as applied to electrical engineering industries. Darmstadt, with a population of 57,000, capital of a duchy numbering in all but 1,000,000 people, maintains a technical high school of university rank. It has the most elaborate equipment for electro-chemical studies and is attended by more than 1,000 day students above eighteen years of age. They enter after thorough preparation in the secondary schools, and the general industry of the country gains by the extended time given to scientific technical training. In this way alone can there be maintained an adequate supply of men competent to direct the great manufactories.

The development of textile schools, including all the various branches of spinning, weaving, designing, dyeing and finishing, particularly impressed the Manchester committee. Laboratory methods, they note, have been discarded in those branches in which chemistry plays a part; the equipment is on a scale approaching that of the works themselves, and affords the same kind of practice as that obtained in the spinning and weaving schools. Thus, students get a practical and effective knowledge of the processes employed. At the renowned Crefeld school, the Prussian government has recently built and equipped a large three-story building as a dyeing and finishing school. Besides the chemical and physical laboratories, drawing rooms, lecture and testing rooms, it contains a fine chemical museum, and a library in which are to be found the technical books of all nations. The instructors are carefully selected and are men of distinction in their specialties. As proof of the esteem in which the school is held, the fact is noted that it is intrusted by the Royal Gobelins factory, in Berlin, with the dyeing of the yarns used in its special productions; also that many manufacturers send yarns to be dyed in shades that they cannot produce. The weaving school is supplied with one hundred and thirty looms. The fees for Prussians are $30 and $45 per session; for other Germans, $45 and $72; and for foreigners, $120 and $180. Recently it was proposed to exclude all foreigners from this and similar schools in the kingdom. The committee observe that these various arts, and especially dyeing, are matters of far greater moment to Manchester than to Crefeld. At the Berlin Municipal Higher Weaving Schools they found the students engaged in manufacturing materials for which Berlin enjoys special repute; namely: buttons, gimp, braids, gold and silver thread, etc., many of which, they regretfully observe, were formerly made at Manchester.

The trade in mantles and ladies' clothing, in which these small wares are used, amounts to $5,000,000 annually. The jealousy with which the secrets of the manufactures are guarded is shown in the exclusion of visitors from the department of the Bureau of Education (Berlin), where models, diagrams and other means of illustration are prepared for distribution to the technical schools of the country. The commercial importance of this elaborate provision of appliances and training is illustrated by the single fact that the world's market in coloring matter and pharmaceutical products derived from coal tar is commanded by Germany. The annual value of these products is estimated at $50,000,000. Germany controls three-fourths and sends 75 per cent of her share abroad. The feature of their system upon which the Germans themselves place great stress, and which the Manchester committee emphasize in their report, is that of thorough general instruction as preliminary to the technical. Money inducements are offered to enable young men of promise to give the time required for adequate preparation as "captains of industry."—The Independent.

RECENTLY PATENTED INVENTIONS.

Bicycle Appliances.

BELL.—William G. Toepfer, New York city. This bell is operated from one of the supporting wheels of the bicycle and is so constructed that two gongs shall be alternately operated by a single trip-wheel. To opposite sides of a rocking support, attached to the frame of a bicycle, the gongs are fastened. The trip-wheel carried by the support engages with the wheel of the bicycle. Levers are connected with the striking arms of the gongs, and are fulcrumed on the pivot of the rocking support. Trip devices carried by the trip-wheel at at its opposite sides extend into the paths of the striking arms and are arranged to operate the latter.

MUD-GUARD.—Charles L. and Alfred A. Seaquest, Portland, Ore. The mud-guard provided by this inventor is designed to be attached to the axles of bicycle wheels and to prevent mud from flying against the rider. The mud-guard has a length of wire bent at an intermediate point. A web attached to the wire adjacent to the bend forms the mud-guard proper. Two additional wires are respectively connected with the arms of the first-named wire. Each of these additional wires and each arm of the first-named wire are embraced by a link. Each end of the first-named wire and the free ends of the second-named wires are bent transversely to fit into the tubular portions of two clips by which the guards are held in place.

RAILWAY-ATTACHMENT FOR BICYCLES.—Charles E. Nichols, Milan, Wash. This invention provides for an attachment by which an ordinary bicycle may be ridden upon railway rails. The attachment comprises essentially a balancing-wheel and a guide-wheel. The balancing-wheel is unflanged and travels upon the rail opposite that over which the bicycle runs. The guide-wheel is flanged and located in advance of the steering-wheel. The wheels are connected to the frame by bars or rods, means being provided for uncoupling the latter. A cord enables the rider to lift the guiding wheel from its track.

Mechanical Contrivances.

ADDING AND RECORDING APPARATUS.—William J. Ensworth, Erie, Pa. The purpose of this invention is to provide an apparatus for registering and recording figures, and to such an end it embodies printing devices for impressing individually the numbers and registering wheels for casting the individual numbers into a total or aggregate sum. The printing devices comprise a series of wheels with printing keys, adjustable by turning the wheels and coacting with an inking ribbon to effect an impression. The registering devices comprise peculiarly constructed registering wheels, always serving to show the sum of the numbers impressed by the printing devices. The two divisions of the apparatus are geared with each other, so that the registering wheels act promptly upon the initial movements of the printing wheels. The machine is useful in banking and mercantile establishments, where it is desirable to dispose many individual numbers in a single column and at the same time to add them into a sum or total.

COMBINED ORE CONCENTRATOR AND SLIMER.—Franklin W. Harlow, Eureka, Col. This apparatus is designed to separate the tailings from the ore in a very simple manner, without causing a great running expense. The apparatus is provided with a bed or pan having a pocket in its bottom and outlet funnels having spouts, the outer ends of which extend through the bottom of the bed at the pocket. The funnel-bodies are held above the bottom of the bed and extend upward to allow the concentrates to settle in the bottom of the bed and to permit the water and tailings to flow down through the funnels. A caisson is arranged over each funnel and is open at the top and bottom. The lower end of each caisson is located a short distance above the top of the corresponding funnel-body. A hopper, located beneath the bed, receives the material passing through the funnels and an endless apron traveling beneath the hopper receives the material discharged upon it.

Miscellaneous Inventions.

ELECTRIC ARC LAMP.—Frederic Wright, Newburg, N. Y. The object of this invention is to provide a lamp having a series of carbons arranged in magazines and having a central main for feeding the carbons automatically one after another as they are consumed. The carbon-magazines are mounted on a casing and carbon-holder tubes extend from the magazines and converge. Carbon locking plates are located on the tubes. An arrangement of solenoids and levers automatically controls the locking plates.

BOILER-FLUE CLEANER.—William Semke, Harrison, Kan. The purpose of this invention is to provide a flue-cleaner in which steam from the boiler may be discharged through a suitable head in the interior of the flues to loosen and remove all adhering foreign matter. The head has an outer section flaring toward and approximately to its front edge. An inner section screws into a nipple formed in the rear of the flaring portion and is closed at its outer end. This section, furthermore, flares forward to a point near its front edge, where it is given a strong outward flare and closely approaches the beveled edge of the outer section, forming therewith a steam passage provided with annular series of openings through which steam passes to flow into the space between the shells.

GARBAGE-CLOSET.—Cornelia S. Robinson, New York city. This garbage-closet is formed in the wall of a building and has a portion of its outer wall inclined downwardly and outwardly, forming a hood projecting out beyond the outer face of the wall of the building and having its bottom closed by a screen. The closet is provided with a flue at the top to carry away the odors.

VENTILATING ATTACHMENT FOR WINDOWS.—Karen C. Sanborn, Brooklyn, N. Y. This attachment is adapted to be fitted in the space between the inclined lower sash and window-frame, provision being made for protection against the entrance of insects. The window-frame is provided with stop-beads hinged to the inner edge of the frame and adapted to be carried parallel with the inner vertical faces of the sides of the window-frame. The lower sash, held to slide in the frame, can be inwardly inclined when the stop-beads are swung inwardly on their hinges. Between the space produced between the sash and frame the attachment is fitted. This attachment comprises a framework covered with a perforated material, locking devices being provided to secure the attachment in place.

ANTI-RATTLING NUT-LOCKING DEVICE FOR THILL-COUPLINGS.—Charles T. Redfield, Glenhaven, N. Y. The purpose of this invention is to provide a device which can be easily applied to the pivot-bolt of a thill-coupling. When the nut of the bolt is screwed up, it will force the device to a positive bearing on the barrel of the coupling and at the same time hold the nut on the bolt in the adjusted position, the bearing of the device on the barrel and its bearing on the nut being independent in action. The device consists of a spring body provided with a tongue-section between its ends and with wings at the ends, one adapted as a means of support and the other for locking engagement with the nut of the pivot-bolt of the thill-coupling.

EXTENSION TABLE.—Charles Poupon, Eagle Lake, Fla. This invention provides for an improvement in extension tables, particularly those which are circular in form, the purpose being to enable a table to be adjusted to any diameter within its capacity by turning a crank or adjusting wheel. The table has its top formed of a large number of sectors, so connected and guided that they may be moved radially inward and outward. The central portion of the table is formed of a thin metal plate covering the sectors, from beneath which they project when the table is extended. In connection with the sectors, adjustable rails or rings are used, which support the outer ends of the sectors, and to which are attached the adjusting means and legs for supporting the outer ends of the sectors. The sectors are also provided with springs to separate them when they are extended and also with a flexible connector by which undue separation is avoided. The bars attached to these rings and to the legs lie radially. The bars are toothed and engage with a central pinion by which all of the bars are forced outwardly or inwardly at the same time and at the same rate.

FOLDING UMBRELLA.—Frank E. Stover and Frank G. Grove, Luray, Va. This invention is an improvement upon that class of folding or collapsible umbrellas in which the ribs are made in sections adapted to slide on one another, rendering it possible to fold the umbrella into half its normal length. The umbrella is provided with a stick formed of telescoping sections provided with longitudinal slots, the slot of the inner section being the longer and sliding in the outer section and formed of two members connected by a link. Ribs are carried by the outer stick section and are formed of sections sliding upon one another. Runners are located on the outer stick section. Two sets of stretchers are pivoted to the runners and to the lower rib-sections. A latch is pivoted in the slots of the stick sections and serves to lock the lower runner in position and the sections of the stick together when the umbrella is opened. A cover is secured to the lower rib sections and is provided with a central opening in which the upper end of the inner stick section is free to slide.

APPARATUS FOR PLAYING DUPLICATE GAMES OF CARDS.—George L. Castner, Brownsville, Tenn. In this apparatus a tray is provided with holders for the reception of the cards. An extension from the body of the tray receives the index projections of a guide board for the purpose of determining throughout the game a certain preferred position of the tray. The projection from the tray has indicators whereby it may be readily determined whether the reverse or the obverse side of the tray is uppermost. This device is of service in playing games similar to duplicate whist.

BINDING FOR BLANK BOOKS.—William B. Boorum, New York city. This invention is an improvement in temporary or refillable bindings for blank books and is particularly intended for use in connection with pads or loose sheets, to form a book for the reception of memoranda. The binding comprises boards forming the sides of the cover, one of the boards being of the full width of the book and the other being narrower. Flexible connections are provided between the boards. There are also means for securing an intermediate portion of the flexible connection to one side of the book-body near its back, whereby either board may be folded about the back and lie smoothly against the other.

BELT-BUCKLE.—Emma B. Winter, New York city. The object of this invention is to provide a buckle which can be conveniently attached to and adjusted on a belt without requiring any sewing. The invention consists principally of a buckle-frame provided on its back with a hook, a toothed bar for engagement with the belt material, the bar being spaced from the back of the frame, and a plate projecting at one side and likewise spaced from the back of the frame, for the passage of the belt between the frame and the plate and for doubling up the end of the belt over the plate, finally to engage the doubled up end with the teeth of the bar.

BOTTLE STOPPER.—John F. Perry, Chicago, Ill. The purpose of this invention is to provide a bottle stopper of simple and cheap construction, which shall require neither the use of external wires or bails, nor the use of a corkscrew, and which shall tightly close the bottle without allowing the contents to come into contact with cork or rubber. The stopper consists of a rigid top-portion with lugs on its sides and a lower elastic plug portion with a rigid facing on its lower end. The bottle-neck has vertical channels and transverse locking grooves, a shoulder lower down in the bottle-neck being adapted to receive the rigid facing on the lower end of the elastic plug to compel the lateral expansion of the plug.

DOOR-HANGER.—James E. Owen, John C. Gabel, Jr., and George F. McKinney, Onarga, Ill. According to this invention a hollow track is provided with a slot in its bottom and with brackets extending around the track from one side of the slot to the other. A carriage is held to travel in the track and consists of a body-bar which extends within the slotted portion of the track. Wheels at each side of the carriage travel in the bottom portion of the track. A drop-door is connected to the carriage by hinges, each hinge consisting of three members

© 1898 SCIENTIFIC AMERICAN, INC.

having a knuckle connection. The lower member of each hinge is secured to the upper portion of the door, the upper member of each hinge being attached to the carriage. A rod connects a lift-lever fulcrumed upon the door with the carriage. A bolt held to slide and rock upon the door is provided with a lateral cam projection adapted to engage the door when the bolt is rotated. A keeper is provided for the bolt independently of the door and also a locking device for the bolt. The device is applicable to freight cars, barns, refrigerators, etc.

Designs.

ANTI-RATTLER PLATE. — Charles T. Redfield, Glen Haven, N. Y. The leading feature of this design consists in arranging an upright wing at an angle slightly less than a right angle to the lower or base wing, which is tapered toward its free end. At its upper end the upright wing is provided with a lateral forked extension.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for 10 cents each. Please send the name of the patentee, title of the invention, and date of this paper.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

Marine Iron Works. Chicago. Catalogue free.

"U. S." Metal Polish. Indianapolis. Samples free.

Gasoline Brazing Forge, Turner Brass Works, Chicago.

Yankee Notions. Waterbury Button Co., Waterb'y, Ct.

Schwaab Stamp & Seal Co., Milwaukee. Send for cat'g.

We buy patents on specialties. or manufacture on royalty. V. P. Van Horne & Co, Dayton, Ohio.

Gasoline Engines and Launches. Free catalogue. Geo. H. Gere Y. and L. Works, Grand Rapids, Mich.

Neuhaus & Pauer, Vienna, Austria. Importers of new machinery and novelties. Best American references.

FERRACUTE Machine Co., Bridgeton, N. J. Full line of Presses, Dies and other Sheet Metal Machinery.

Improved Bicycle Machinery of every description. The Garvin Machine Co., Spring and Varick Sts., N. Y.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, $4. Munn & Co., publishers, 361 Broadway, N. Y.

☞ Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated: correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(7461) M. R. B. asks how to prepare a drill for making holes in glass. A. A flat drill, made of new steel and heated to a dark red and plunged in the ordinary zinc chloride soldering solution, will drill glass readily. The drill must be sharpened before it is hardened.

(7462) R. A. C. says: 1. How can a fine telescope lens be cleaned without injuring it? A. A very soft old linen handkerchief is best; if greasy, wipe with a little tissue paper wet with weak alkali. Lenses should be cleaned as rarely as possible; use old linen, not silk. 2. How can ranges of vision at sea, from different elevations, be estimated? A. You will find a full description of range finders in our COAST DEFENCE SUPPLEMENT. Mailed for 25 cents.

NEW BOOKS, ETC.

THE STORAGE BATTERY. A Practical Treatise on the Construction, Theory and Use of Secondary Batteries. By Augustus Treadwell. New York: The Macmillan Company. 1898. Pp. xix, 257. Price $1.75.

In pursuing his work with storage batteries the author found himself greatly hampered by the lack of any compact data concerning the construction of many cells which have been and which are on the market and by the paucity of reliable discharge curves. Believing that a book containing such data and curves would prove valuable, not only to the student and manufacturer, but also to all who are interested in storage batteries, he began the compilation of the book and has succeeded admirably. American and foreign patents are cited at the bottom of the pages.

A TREATISE ON MAGNETISM AND ELECTRICITY. By Andrew Gray. In two volumes. Vol. I. London and New York: Macmillan & Company. 1898. Pp. xvi, 472. Price $4.50.

The author of the present work deals with the subject largely from a mathematical standpoint. The work is not a treatise on the mathematical theory of electricity only, but successfully brings theory and practice together. Some elementary acquaintance on the part of the reader with electrical phenomena and their laws is presupposed, and a considerable knowledge of mathematics is also needed. By those who can understand a work of this kind it will be warmly welcomed.

COAL CATECHISM. By William Jasper Nicolls. Philadelphia and London: J. B. Lippincott Company. 1898. Pp. 218. Price $1.50.

The "Coal Catechism" is intended for a great number of intelligent readers who have no technical training and yet who prefer to seek knowledge by reading special subjects rather than fiction. A large proportion of them have neither time nor inclination to peruse the great geological and statistical reports of the coal industry of the United States or to study the subject in technical works. Information is conveyed in the popular question and answer form. It is rather a good idea to have a series of books on similar subjects, and it is to be hoped that this volume may be the precursor of many others dealing with similar subjects. The book is attractively printed and bound and is provided with a comprehensive index.

THE TRACTION ENGINE: ITS USE AND ABUSE. By James H. Maggard. Revised and enlarged by an expert engineer. Philadelphia: David McKay. 1898. Pp. 128. Price $1.

A book of instruction for operators of farm engines has been needed for some time, and the present work appears to deal with the subject in a practical manner. First a general description of trucking engines is given, followed by general directions for the proper use of engines and boilers, telling what to do in case of an emergency.

TALES FROM MCCLURE'S: WAR. Being true stories of camp and battlefield. New York: Doubleday & McClure Company. 1898. Pp. 193. Price 25 cents.

A charming series of little books is now being issued by the publishers of McClure's Magazine. The present volume, of almost vest pocket size, contains a number of thrilling stories by Major-General Nelson A. Miles and others.

AMERICAN CEMENTS. By Uriah Cummings. Boston: Rogers & Manson. 1898. 8vo. Pp. 299. Price $3.

Since the publication of Gen. Gillmore's classic work, many years ago, no book has been produced which deals with the subject of American rock cements. The period since the publication of Gen. Gillmore's treatise has been far the most important in the history of the industry. The changes which have taken place during this time, the marked advances which have been made and the new processes which are being employed and the marvelous growth of the trade resulting from a widening of the markets for the production, clearly present a profitable field for investigation, and furnish many facts worthy of record. In the present book adequate consideration has been paid to the claims and merits of American rock cements. The arrangement of the book is excellent, and it is a fine piece of technical book-making. The subject of cements is treated in all its bearings and special attention is paid to tests of all kinds. Another section of the book is devoted to various cement works, including artistic views of them. There is quite a full list of structures made in American rock cement, giving the location of the various cement works from which the cement was obtained.

OUTLINES OF PRACTICAL HYGIENE. By C. Gilman Currier, M. D. Third edition, revised and enlarged. E. B. Treat & Co. 1898. Pp. 461. Price $2.

Practical hygiene is one of the most important subjects which the architect or physician has to encounter. The present work appears to be an eminently thorough and practical treatise upon the subject, dealing with soil and climate, clothing, bathing, exercise, occupation, lighting, heating, ventilating, building and streets, foods, diet, water, the disposal of wastes, the disposal of the dead, bacteria, disease and disinfection, longevity, etc. The book does not discuss therapeutical measures, except in so far as they belong legitimately within the domain of hygiene.

A MANUAL OF HYGIENE AND SANITATION. By Seneca Egbert. Philadelphia and New York: Lea Brothers & Company. 1898. Pp. 368, vii. Price $2 25.

The present work contains a plain statement of the fundamental principles and facts of hygiene and sanitation, together with such explanations and details based on American practice as serve to make the work clear and readable. Of all the medical sciences, clearly the most important is that which prevents disease instead of curing it, and which deals with entire communities as well as with individuals. We cannot have too many good books on this subject. The present book appears to be an excellent one and fully up to the times.

HAND-BOOK OF NATURE STUDY. For teachers and pupils in elementary schools. By D. Lange. New York and London: The Macmillan Company. 1898. Cloth, 12mo. Pp. 329. Price $1.

This work is a valuable primer to natural history and science, and is calculated to afford teachers the means of inculcating their pupils with desirable and essential knowledge regarding the more common plants, trees, birds, insects and quadrupeds, without entailing upon themselves special courses of study. The book is thoroughly practical, and as valuable to the instructed as to the instructor.

THE GENERAL MANAGER'S STORY. Herbert Elliott Hamblen. New York: Macmillan Company. 1898. Pp. 311. Price $1 50.

We cannot have too many good stories about American railway life, which differs in many respects from that in other countries. The book is very interesting and, at the same time, gives a great deal of information about railroading which the ordinary individual is desirous of acquiring, when he can obtain it with little mental effort. After reading this book, one can discuss learnedly about "broke in two," "flagging" and other mysteries of the rail.

ELECTRIC CATALOGUE OF ELECTRICAL PLANTS AND MACHINERY FOR ELECTRIC LIGHTING, TRANSMISSION OF POWER, ELECTRO-PLATING, DEPOSITING, WELDING, ETC. By Ernest Scott & Mountain, Limited. Newcastle-on-Tyne.

The volume before us is a bound collection of catalogues, and is interesting as showing the use of electric power for many purposes. It is handsomely got up and is freely illustrated by wood engravings, half tones and line drawings. It probably illustrates some of the best examples of British engineering practice.

THE DIFFERENTIAL. Published by the Junior Class of Case School of Applied Science. Cleveland, Ohio. Pp. 147, xxxiii.

THE MDCCCXCIX CORNELLIAN. The book of the Junior Class of Cornell University. Vol. xxx. 1898. Pp. 284, 49.

TO INVENTORS.

An experience of fifty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

JUNE 28, 1898,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Abdominal supporter, S. L. Fowler 606,410
Acid and making same, amidonaphtholdisulfo, F. Bender 606,437
Adjustable chair, J. J. White 606,612
Aerated water fountain or engine, Brake & McKee 606,373
Air compressor, F. Richards 606,428
Alarm. See Automatic alarm. Burglar alarm. Safe alarm.
Alarm system, C. Coleman 606,405
Aluminum sulfid and making same, D. A. Peniakoff 606,576
Animal trap setting device, D. Luye 606,566
Atomizer, R. W. Prescott 606,240
Auger, A. Y. Pearl 606,575
Auger, H. G. Watrous 606,319
Automatic alarm for protecting crops, etc., L. L. Cubbedge 606,517
Automatic switch, F. W. Ross 606,392
Axle boxes, dust guard for car, J. S. Patten 606,232
Back pedaling brake, L. E. Hoffman 606,217
Bag holder, seed, C. N. Choate 606,274
Bamboo rods, reducing and shaping, Durant & Prichard 606,623
Battery. See Voltaic battery.
Bearing, antifriction, J. E. Lawrence 606,485
Bearing, ball, S. T. Randolph 606,241
Bearing, ball, J. R. Saucier 606,491
Bearing, roller, Timken & Heinzelman 606,636
Bearing, vehicle roller, Timken & Heinzelman 606,635
Bed, invalid, J. M. Scribner 606,247
Belt clamp, Carley & Rickards 606,512
Belt, endless, A. Christensen 606,376
Bicycle attachment, M. Burt 606,185
Bicycle attachment, C. S. Morse 606,389
Bicycle brake, J. L. Allen 606,496
Bicycle brake, J. M. Downer 606,334
Bicycle brake, J. Higson 606,626
Bicycle handle bar, adjustable, W. C. Dayhoff 606,192
Bicycle saddle, B. S. Seaman 606,393
Bicycle seat, W. H. Thomas 606,314
Bicycle seat support, J. M. Glennon 606,455
Bicycle steering guide, Dunning & Barrow 606,525
Bicycle support, W. Metzrath 606,487
Bicycle support, P. Person 606,578
Bicycles, etc., carrier for, W. M. Tegart 606,367
Billiard table frame, J. Dockstader 606,196
Binder for sheet music, etc., H. E. Veit 606,434
Block. See Wood block.
Boiler. See Sectional boiler.
Boiler attachment, steam, A. Griese 606,354
Boiler grate, steam, Davy & Edey 606,191
Book cover, writing, C. J. Ainsworth 606,180
Book, manifolding, H. Whitfield 606,321
Book, wall, G. R. Pease 606,233
Bottle cap, Scholey & Schrader 606,588
Bottle, non refillable, E. C. Bowne 606,507
Bottle, non-refillable, J. McCafferty 606,293
Bottle, non-refillable, H. Strawson 606,309
Bottle, non-refillable, J. A. Trimble 606,256
Bottle stopper, N. Lindbergh 606,290
Box. See Folding box.
Brace. See Excavation extension brace.
Brake. See Bicycle brake. Car brake. Wagon brake.
Brake beam, W. A. Pungs 606,298
Brake for hoists or similar apparatus, A. Bolzani 606,268
Brake pipe connection, C. W. Vaughan (reissue) 11,673
Brush, J. T. Burnip 606,184
Brush, clothes line, D. F. Gallagher 606,482
Brush machine gage device, M. Young 606,371
Buckle, D. E. Hipwell 606,627
Buckle, G. E. Lawrence 606,629
Buckle for trace carriers, back band, M. Dallas 606,518
Burglar alarm, S. B. & M. M. Daniels 606,519
Burner. See Coal burner. Gas burner. Hydrocarbon burner.
Button, A. S. Crane 606,277
Cabinet, photograph, T. F. Adams 606,325
Cake turner, M. D. Good 606,205
Camera focusing attachment, D. E. Sharretts 606,394
Camera, photographic copying, H. Stender 606,593, 606,594
Can head, key opening, B. W. Morfoot 606,471
Car brake, J. Ruff 606,585
Car brake beam, railway, Simpson & Handiges 606,308
Car brake, electrohydrostatic automatic, Buchel & McGloin 606,330
Car coupling, G. T. Rohn 606,583
Car coupling, A. Ruscher 606,245
Car coupling, J. Timms 606,603
Car draught rigging, railway, J. Conrath 606,447
Car driving gear, motor, W. Sydenham et al 606,311
Car side bearing, railway, C. F. Huntoon 606,345
Carriage rocker attachment, baby, G. L. Morgan 606,569
Carrier. See Parcel carrier.
Carrying apparatus, J. Anderson 606,618
Case. See Telescopic case.
Cash indicator and recorder, W. W. & W. H. Wythe 606,324
Cash register, T. Carney 606,188
Cask or barrel manufacturing machinery, R. Collen 606,516
Cask pitching apparatus, P. Sherrer 606,396
Casket, T. H. Linahan 606,466
Caster, J. A. Kennedy-McGregor 606,462
Caster, Merritt & Groff 606,354
Cement, making slag, C. J. Curtin 606,278
Chair. See Adjustable chair.
Chair and bed, combined, B. Murtagh 606,488
Chimney cleaner, A. Messenger 606,567
Chlorin derivatives of toluene, making, P. P. Monnet 606,470
Chute and crib, revolving coal, R. T. Darrah 606,520
Cigar tip cutter, T. A. Cole 606,377
Cigarette, H. Goldenfarb 606,537
Clamp. See Belt clamp. Fence clamp. Sewing machine presser clamp.
Clevis, plow, A. Braatz 606,509
Clock, carriage, H. W. Mitchell 606,568
Clothes drier, E. A. Williston 606,401
Clothes line, P. Sinnott 606,363
Clutch, friction, Worrall & Lesperance 606,634
Coal burner, pulverized, G. W. Prescott 606,239
Coat support, J. T. Stevens 606,477
Cock, stop and waste, J. H. Glauber 606,535
Coin operated mechanism, J. D. Kneedler 606,463
Collar blanks, etc., machine for forming and folding, A. D. Fenwick 606,528
Combs, apparatus for drawing off in circle, Long & Foster 606,564
Cooking utensil, A. F. Humphrey 606,552
Corn binder bundle carrier, Pridmore & Johnston 606,579
Cot, folding, C. F. Moore 606,355
Counter cutting machine, D. L. Chandler 606,375
Coupling. See Car coupling. Pipe coupling. Thill coupling.
Cows from kicking, device for preventing, C. A. Eidsmoe 606,481
Crotchet or lace holder, W. O. Hill 606,215
Cross tie, metallic, W. F. Penner 606,577
Crushing roll, A. Pesant 606,234
Current indicator, T. W. Varley 606,369
Curtain fixture, J. B. Bullis 606,442
Curtain fixture, A. S. Lord 606,468
Curtain folding machine, J. Heselwood 606,341
Cutter. See Cigar tip cutter. Meat or vegetable cutter. Pipe cutter. Potato cutter.
Cycle, J. A. Wronski 606,323
Dental base plate, W. R. Evans 606,198
Dental matrix retainer, J. W. Ivory 606,460
Dental mouth mirror, C. Harnden 606,456
Desk attachment, W. H. Carrier 606,514
Disinfecting apparatus, F. Gizzi 606,338
Display rack, H. D. Wells 606,610
Distance traveled by cars, etc., mechanism for indicating, J. H. Whiting 606,258
Double or compound fork, E. M. Bradley 606,372
Dress guard attachment, W. Shirley 606,492
Dress shield, B. F. Sutton 606,251
Drier. See Clothes drier. Glove drier.
Drill. See Electric drill.
Drills, etc., machine for shaping or forging and sharpening rock, S. P. Quick 606,390
Dye and making same, blue, B. Heymann 606,212
Dye and making same, blue azin, Ott & Kroeber 606,295
Dye and making same, blue tertrazo, J. Bammann 606,181
Dye and making same, dark blue tetrazo, J. Bammann 606,264
Dye, blue, F. Bender 606,436
Dye, blue black, F. Bender 606,438
Dye, green disazo, F. Bender 606,439
Dye, yellow brown cotton, R. Demuth 606,193
Electric drill, portable, E. Holmes 606,549
Electric machine, dynamo, R. S. Dobbie 606,407
Electric motor, J. G. Truman 606,605
Electrical communication, system for, A. T. Brown 606,620
Electrical distribution system, Scott & Lamme 606,589
Electromotive force, regulation of rotary transformer direct current, B. G. Lamme 606,590
Elevator safety device, R. Paroselli 606,489
Engine. See Explosive engine. Gas engine. Hydraulic engine. Locomotive engine. Rotary engine. Self lubricating engine.
Engine muffler, G. L. Gardner 606,280
Engines, electric igniter for gas, A. J. Tackle 606,312
Envelope, J. A. Lefferts 606,349
Envelope, G. Southard 606,366
Envelope fastener, W. Barnard 606,498
Envelope opener, W. Yates 606,261
Excavation extension brace, J. K. Murphy 606,631
Explosive engine, S. Bouton 606,504
Fabrics, apparatus for applying liquids to textile, F. Girard 606,454
Farm gate, T. C. Lippitt 606,467
Faucet, automatic gaging, H. E. Knottnerus 606,559
Feed water regulator, L. Dery 606,195
Fence, I. N. Feltenberger 606,527
Fence, Flesher & Crisler 606,530
Fence clamp, wire, F. Johnson 606,461
Fence compensator, wire, S. C. Bowen 606,506
Fence machine, A. L. Kitselman 606,420
Fence post, L. E. Ketchum 606,558
Fence spacer, wire, C. Baxter 606,182
Fence stay weaving device, Baxter & Schrader 606,266
Fence tightener, wire, S. C. Bowen 606,505
Fencing, woven wire, A. L. Kitselman 606,421
File and locking mechanism, card indexing, H. Hamilton 606,286
File, letter, C. C. Boykin 606,508
Filter, W. A. Hull 606,218
Filter, O. H. Jewell (reissue) 11,672
Filter, J. Wilson 606,260
Filter, water, H. Snell 606,592
Filtering apparatus, G. G. Fryer 606,453
Firearm sight, S. E. Fischer 606,452
Fire hydrant, N. Barry, Jr. 606,500
Fireproof mask, P. Dallinger 606,379
Fireproof partitions, skeleton structure for, P. Kuhne 606,348
Fireproof plastering support, A. Kuhn 606,387
Flashlight powder apparatus, A. Hemsley 606,340
Fluid meter, prepayment, H. Green 606,625
Fluid pressure motor, P. Schlachter 606,304
Fodder bundler, H. J. Kester 606,287
Folding box, A. O. Hubbard 606,459
Food compound and making same, W. Gebhardt 606,624
Fork. See Double or compound fork.
Fountain. See Aerated water fountain.
Fruit picker, Drysdale & Raburn 606,524
Fumigator, J. T. Commoss 606,446
Furnace, W. Stubblebine 606,608
Furnace, F. E. Swift 606,253
Garbage from buildings, apparatus for disposing of, I. C. Goodridge 606,483
Gas burner, R. Momand 606,225
Gas compressor, J. Sedlacek 606,430
Gas engine, T. H. Hicks 606,386
Gas forming apparatus, D. Clegg 606,189
Gas generating apparatus, acetylene, Grenier & Grand 606,539
Gas generating gas fixture, J. F. Williams 606,435
Gas generator, acetylene, H. Schneckloth 606,305
Gas tip, acetylene, L. K. Bohm 606,441
Gate. See Farm gate. Railway safety gate.
Gate, C. D. Bell 606,502
Gate, S. Stout 606,250
Generator. See Gas generator. Smoke generator.
Glass worker's tool, L. Friedrich 606,200
Glove, L. A. Van Praag 606,399
Glove drier, J. W. Hull 606,628
Governor, explosive engine, H. P. Maxim 606,425
Grading and ditching machine, C. F. Hinman 606,216
Hame or collar fastener, C. J. D. Strohecker 606,598
Hammer, power, C. A. Vaughn 606,370
Hammock frame, A. A. Young 606,616
Hanger. See Shaft hanger.
Harrow, rotary, R. Rakestraw 606,300
Harvester, potato, J. N. Cocker (reissue) 11,674
Hat guard, W. Lord 606,486
Heating or vulcanizing apparatus, G. W. Slater 606,364
Heel, J. E. O'Neill 606,229
Hinge, lock, W. M. Hotaling 606,415
Hoof pad, C. J. Horton 606,343
Hook. See Pail hook. Whiffletree hook.
Horse detacher, C. F. Kincheloe 606,419
Hub, vehicle, W. T. Lewis 606,350
Hydraulic engine, J. Gill 606,337
Hydrocarbon burner, liquid, G. W. Prescott 606,238
Incandescent burner protector, J. W. McKnight 606,226
Incandescent lights, mantle or hood for Welsbach or other, J. Moeller 606,224
Indicator. See Cash indicator. Current indicator. Station indicator. Valve indicator.
Ink, printing, F. B. Hall 606,542
Iron, making planished sheet, J. Stephens 606,595
Ironing table, W. E. Harriman 606,210
Jar. See Fruit jar.
Jar and can opener, fruit, J. J. Schairer 606,587
Jewelry, article of, F. X. Zirnkilton 606,617
Kite, J. F. Cooley 606,622
Knitting machine, circular warp, A. E. Lindner ..... 606,351 to 606,353
Knob attachment, J. H. Shaw 606,590
Label, druggist's and medicine, Harris & Stahl 606,457
Labeling machine, can, T. C. Northcott et al 606,227
Ladder, extension, F. Heine 606,455
Lamp, R. D. Cody 606,445
Lamp, acetylene gas, G. E. Hesse 606,385
Lamp, acetylene gas generating, H. Oehl 606,228
Latch, H. E. Russell 606,246
Latch and lock combined, O. Holmes 606,550
Lid for pots, etc., J. W. Strother 606,599
Lifter. See Sash lifter.
Liquid conveyer, W. J. York 606,615
Lock. See Seal lock.
Lock, J. A. Gray 606,282
Locomotive engine, compound, G. S. Strong 606,633
Locomotive, oil burning, G. W. Prescott 606,237
Loom, G. F. Hutchins 606,553
Lubricator, McNeil & Rogers 606,294
Malt stirrer, J. A. Saladin 606,586
Manhole cover, T. P. Greger 606,206
Meat or vegetable cutter, I. P. Buckles 606,511

(Continued on page 30)

© 1898 SCIENTIFIC AMERICAN, INC.

Advertisements.

ORDINARY RATES.

Inside Page, each insertion. - 75 cents a line
Back Page, each insertion, - - $1.00 a line

☞ *For some classes of Advertisements, Special and Higher rates are required.*

The above are charges per agate line—about eight words per line. This notice shows the width of the line, and is set in agate type. Engravings may head advertisements at the same rate per agate line, by measurement, as the letter press. Advertisements must be received at Publication Office as early as Thursday morning to appear in the following week's issue.

Star ★ Lathes
Foot power Screw... ...cutting Automatic Cross feed
9 and 11-inch Swing.
New and Original Features
Send for Catalogue B.
Seneca Falls Mfg. Company,
695 Water St., Seneca Falls, N.Y.

AMERICAN PATENTS.—AN INTEResting and valuable table showing the number of patents granted for the various subjects upon which petitions have been filed from the beginning down to December 31, 1894. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. **1002**. Price 10 cents. To be had at this office and from all newsdealers.

POWER & FOOT LATHES. SHAPERS, PLANERS, DRILLS, MACHINE SHOP OUTFITS, TOOLS AND SUPPLIES. CATALOGUE FREE.
SEBASTIAN LATHE CO. 120 CULVERT ST. CINCINNATI, O.

HAVE THE LATEST IMPROVEMENTS.
No machine shop can be thoroughly up-to-date unless it has the most modern perfected tools. For instance, the

ASHLEY PATENT NIPPLE HOLDERS
hold nipples for cutting *either right or left hand* threads. They hold the sleeve from turning and take the strain off both the sleeve and shank thread. Made of best quality cast steel, carefully fitted. Long or short nipples cut with equal facility. The Ashley Holders are of light weight and compact form.
WALWORTH MFG. CO., 20 Oliver St., Boston, Mass.

Water Emery Tool Grinder
Has no pumps, no valves. No piping required to supply it with water. Always ready for use. Simplest in construction, most efficient in operation.
☞ *Send for catalogue and prices.*
W. F. & JNO. BARNES CO.
1999 Ruby St., Rockford, Ill.

WOODWORKING MACHINERY.
For Planing Mills, Carpenters, Builders, Furniture, Chair, Vehicle, Wheel and Spoke Makers, etc.
☞ *Correspondence Solicited.*
Illustrated 312-page Catalogue free to manufacturers and foremen.

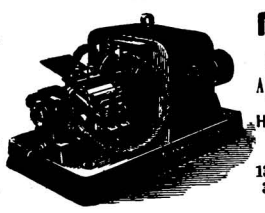
THE EGAN CO.
327 to 347 West Front Street,
CINCINNATI, OHIO.

Gas Blast Furnaces
GAS PRODUCERS
AND
PRESSURE BLOWERS.
For Illustrated Pamphlets, apply to
AMERICAN GAS FURNACE CO.
23 John Street, New York, N.Y.

IT SIMPLIFIES DIFFICULT WORK
There are many unique features in our **Hand and Power Pipe Threading and Cutting Machine** It has our Standard Adjustable Quick Opening and Closing Die Head with convenient "cam" movement. Five Chasers, set by graduation to any size needed. Can be released from Threading while in motion, opened to permit pipe being cut and closed instantly and positively. *Send for Catalogue.*

THE MERRELL MANUFACTURING CO., 501 Curtiss St., Toledo, Ohio

Send your business card for 160 p. 1898 catalogue.



NICKEL
AND
Electro-Plating
Apparatus and Material.
THE
Hanson & VanWinkle Co.,
Newark, N. J.
136 Liberty St., N. Y.
35 & 37 S. Canal St., Chicago.

Physical and School Apparatus
GALVANOMETERS
STANDARD, SINE, TANGENT, REFLECTING and WIEDEMANN GALVANOMETERS . . . . .
Catalogue free.

E. S. Ritchie & Sons, Brookline, Mass.

25c. Worth of Tool Knowledge

All about every known Tool for every trade. Descriptive cuts of each with present market prices. Send 25 cents at once for
MONTGOMERY'S TOOL CATALOGUE
for 1898. 510 pages with index at back. A handy book for every machinist and foreman of workshop or factory. The finest and most accurate illustrations. Book is pocket size, 6¼ x 4¼ inches, with rounded edges. Address
MONTGOMERY & CO.
105 Fulton Street. New York.

On Receipt of Ten Cents in Stamps (practically 25% of retail price) **we will send you one of our**
I-2 INCH AUGER BITS

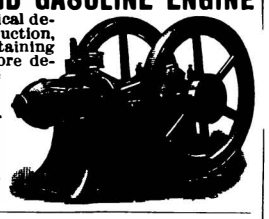
A fine cutting tool, perfect clearance, especially good in hard wood and for end boring. *Send for Cir. S. A., free.*
THE FORD BIT CO., HOLYOKE, MASS.

Motor meter, alternating current, Mollinger & Kurda..... 606,630
Mop, H, A. Wolff..... 606,495
Mud guard, R. H. Reid..... 606,359
Music leaf turner, R. E. Swartz..... 606,252
Musical instrument, electromechanical, G. H. Davis..... 606,279
Musical instrument picker device, stringed, W. Gustafson..... 606,207
Musical instrument picker device, stringed, Kendall & Tirrell..... 606,220
Musical instrument picker device, stringed, Lorenz & De Lue..... 606,222
Musical instrument pneumatic action, C. B. Kendall..... 606,219
Myrioscope, automatic, A. Peterson..... 606,236
Needle, puncture repair, E. P. McAllister..... 606,570
Nut lock, F. Binn..... 606,328
Nut lock, J. Roblin..... 606,582
Nut lock, W. W. Sweigart..... 606,253
Oil by water pressure, means for raising, E. Stretch..... 606,432
Oiling device, J. S. Scarborough..... 606,303
Organ coupler, pneumatic, M. Clark..... 606,444
Oscillating meter, Thayer & Everett..... 606,601
Overshoe attachment, J. C. Gillam..... 606,301
Oxyethylacetanilid, O. Klimmek..... 606,288
Pad. See Hoof pad.
Pail hook, C. W. Mitchell..... 606,469
Paper tube forming machine, F. S. Barus..... 606,402
Parcel carrier, D. J. McMcCarthy..... 606,571
Pattern exhibitor, A. Peterson..... 606,235
Pen, fountain, G. S. Parker..... 606,231
Penholder fountain attachment, C. J. Renz..... 606,360
Pencil rubber attachment, W. P. Huffman..... 606,551
Perambulator, W. H. English..... 606,451
Pessary, A. M. Longshore-Potts..... 606,505
Photographs, automatic apparatus for taking, R. W. Vining..... 606,318
Picker. See Fruit picker.
Picture frame and match safe or receptacle, combined, J. V. Christl..... 606,621
Pile cutting machine, weft, J. B. Daymont..... 606,406
Pin. See Safety pin.
Pipe. See Tobacco pipe.
Pipe coupling for broken water closet bowls, J. H. Glauber..... 606,536
Pipe cutter, D. S. Grant..... 606,538
Pipe wrench, J. E. McDonald..... 606,572
Pistol, magazine, W. H. Trippett..... 606,493
Pliers, J. C. Slack..... 606,591
Plow, A. Reifsnyder..... 606,242
Plow, J. W. Ross..... 606,490
Plow attachment, S. H. Ritter..... 606,244
Plow, cultivator, Weed & Atkin..... 606,609
Plow, disk, E. M. Heylman..... 606,412
Pocket and guard, combined watch, M. J. Clark..... 606,275
Pool table, parlor, P. L. Hayes..... 606,546
Post. See Fence post.
Post office box cabinet, J. C. Keith..... 606,556
Postmarking and stamp canceling machine, Vail & Potter..... 606,257
Pot bail holder, M. A. Cogley..... 606,276
Potato cutter and planter, J. A. Mengelet al..... 606,291
Pressing machine, Tremaine & Lorillard..... 606,478
Primer, ordnance, T. G. Bennett..... 606,440
Printing and folding machine, N. A. Stimson..... 606,397
Propeller, screw, W. J. Perkins..... 606,297
Propeller, screw, P. A. N. Winand..... 606,322
Protractor, M. S. Hoy..... 606,344
Puller. See Stump puller.
Pump valve gear, J. Doherty..... 606,480
Push button, F. J. List..... 606,562
Rack. See Display rack.
Rail chair, G. D. Claflin, Jr..... 606,515
Railway coupling attachments, spring protecting device for, W. Thornburgh..... 606,316
Railway crossing, C. Hansel..... 606,339
Railway foot guard, C. F. Beerstecher..... 606,501
Railway safety gate, H. C. Wilson..... 606,259
Railway signal, J. S. Dunn..... 606,197
Railway signaling system, C. H. Davis..... 606,450
Railway switch and signal mechanism, J. W. Thomas, Jr..... 606,602
Railway switch lock, Schager & Lundin..... 606,362
Railway switch operating mechanism, street, F. M. & W. W. Tyler..... 606,433
Railway turntable, J. H. Harting..... 606,544
Raisin seeding machine, H. Bardsley..... 606,265
Range, steel, A. E. Bronson..... 606,510
Reaping machine grain reel, M. G. & P. P. Keen..... 606,346
Refrigerating machine, absorption, F. Allen..... 606,326
Register. See Cash register.
Regulator. See Feed water regulator.
Rein holder, N. M. Davis..... 606,521
Roadway guard, automatic, W. O. Wisner..... 606,614
Rolling apparatus, D. C. Prescott..... 606,474
Rolls, P. M. Weber..... 606,608
Roofing, thatch, C. N. Bushnell..... 606,186
Rotary engine, J. J. Unbehend..... 606,606
Rotary motor, C. F. C. Lohmann..... 606,563
Rule, slide, J. G. D. Mack..... 606,388
Saddle, H. W. G. Plunkett..... 606,281
Safe alarm, J. F. Jones..... 606,555
Safe, passenger car, I. Freed..... 606,336
Safety pin, H. S. Brewington..... 606,374
Safety pin, M. Rhine..... 606,427
Sap spout, E. Willis..... 606,613
Sash fastener, O. L. Corbin..... 606,448
Sash fastener, J. Greife..... 606,484
Sash lifter and lock, G. C. Young..... 606,262
Sash, window, H. Pedersen..... 606,296
Saw set, J. Frederickson..... 606,335
Scale fulcrum and bearing, E. Finn..... 606,529
Scissors or shears, sheet metal, M. C. Ogden..... 606,472
Scow, dumping, E. Lays..... 606,289
Scraper, dirt, F. Grote..... 606,540
Scraper for roadwork or ditching, J. E. Rich..... 606,580
Screw cutting die head, K. Mischke..... 606,223
Scutching machine feeder, E. G. A. Schenson..... 606,476
Seal lock, J. Dowling..... 606,408
Seal lock, M. E. Kanaly..... 606,418
Sectional boiler, H. H. Taylor..... 606,313
Seed separator, cotton, J. A. Garrett..... 606,533
Seeding machine, K. Puskas..... 606,475
Self lubricating engine, E. E. Hanna..... 606,543
Separating laminated packs, machine for, T. A. Dobbins..... 606,522
Separator. See Seed separator. Steam separator.
Separator, O. M. Morse..... 606,292
Sewing machine, buttonhole, J. C. Goodwin..... 606,204
Sewing machine presser clamp, buttonhole, J. Laird..... 606,423
Sewing machine shuttle, M. F. Burroughs..... 606,443
Sewing machine threader, L. J. Bowman..... 606,269
Shade adjuster, window, F. L. Bailey..... 606,263
Shade bracket holder, window, P. N. Rademann..... 606,299
Shade trimmer, J. B. Hinthorn..... 606,548
Shaft hanger, Bebout & Brandon..... 606,327
Shafts, tubes, etc., machine for straightening, H. W. Hill..... 606,214
Sharpening lawn mowers, attachment for, A. B. Doty..... 606,333
Shearing and punching machine, J. E. Denham..... 606,194
Shingle sawing machine, E. H. Kruger..... 606,422
Ship building plant, W. I. Babcock et al..... 606,497
Ship calking instrument, W. P. Freeman..... 606,199
Ship frame bending apparatus, M. H. C. & R. E. C. Shann..... 606,306
Shoe upper turning and beading machine, S. Ross 606,301
Shovel. See Snow shovel.
Sign, electrical, M. Norden..... 606,356
Signal. See Railway signal.
Signal, J. G. Schreuder..... 606,429
Skins, machine for pulling or plucking rabbit, J. & F. Taylor..... 606,255
Smoke generator, T. Thomson..... 606,315
Snow shovel, J. Gifford..... 606,534
Soaring machine, W. P. Butusov..... 606,187
Spectacle frame, F. L. Burrows..... 606,272
Spectacles, A. L. Greene..... 606,283
Staircase for dwellings, H. E. Cassel..... 606,273
Stairway nosing strip, F. Furness..... 606,532
Starching machine, Hagen & Cooper..... 606,411
Station indicator, E. H. B. Chew..... 606,331
Steam separator, F. B. Corey..... 606,190
Stirrup, safety, J. W. Thorn..... 606,368
Stoker, mechanical, J. Vicars et al..... 606,607
Stopper. See Bottle stopper.
Stovepipe, W. P. Riviere..... 606,581
Straw or strand feeding device, F. E. Arrouquier. 606,619
Street sweeper, E. J. Smith..... 606,248
Stump puller, Rigdon & Dobson..... 606,391
Switch. See Automatic switch. Railway switch.
Switch operating device, G. B. Barron..... 606,499
Table. See Ironing table. Pool table.
Table cloth supporter, A. R. Bishop..... 606,267
Tableware, flat metal, G. H. Brabrook..... 606,183
Tack driving apparatus, A. E. Strickler..... 606,596
Telegraph instrument, J. L. Cutler..... 606,449
Telegraph, printing, B. A. Brooks..... 606,329
Telephone system, W. A. Gustafson..... 606,285
Telescopic case or traveling bag, enlargeable, Kruppa & Lehrer..... 606,221
Thermocauter, C. F. Dewitt..... 606,380
Thill coupling, antirattling, W. E. Sherwood..... 606,307
Threshing machine, J. Borsum..... 606,503
Threshing machine self feeder, G. D. Stowe..... 606,597
Tie. See cross tie.
Tire and repairing same, pneumatic, C. E. Buckbee..... 606,271
Tire, bicycle, J. Toren..... 606,604
Tire, elastic, J. N. Dages..... 606,378
Tires, back pressure valve for pneumatic, C. Graf 606,383
Tobacco pipe, G. G. Palmer..... 606,473

(Continued on page 31)

This beats Wind, Steam, or Horse Power. We offer the
WEBSTER 2¼ actual horse power
GAS ENGINE
for **$150,** less 10% discount for cash. Built on interchangeable plan. Built of best material. Made in lots of 100 therefore we can make the price. Boxed for shipment, weight 800 pounds. Made for Gas or Gasoline. Also Horizontal Engines, 4 to 30 horse power.
☞ *Write for Special Catalogue.*
WEBSTER MFG. CO., 1074 West 15th St., CHICAGO
Eastern Branch, 38-D Dey Street, New York City.

KNIGHT GAS AND GASOLINE ENGINE
Excellency in mechanical design, simplicity in construction, sensitive governing, obtaining steadier motion and more desirable results, are the superior points in our engines.



☞ *Send for Circular "S. A."* Address
KNIGHT MFG. CO.
1718 S. Market Street,
CANTON, OHIO.

NO FIRE, SMOKE, OR HEAT. ABSOLUTELY SAFE

$200 and up. Send 5 stamps for Catalogue.
Truscott Boat Mfg. Co., Drawer 9, St. Joseph, Mich.

ALCO VAPOR LAUNCH

Motor controlled from bow. Valve movement, 12 to 1, 16 to 60 ft. Launches. Twin Screws a specialty. 1, 2, 3, 5, 7, 12 H. P. No licensed engineer or pilot required. Speed and Safety guaranteed. No dangerous Naphtha or Gasoline used. No disagreeable vibration.
☞ *Send Ten Cents in Stamps for 1897 Catalogue.*
Marine Vapor Engine Co., ft. Jersey Av., Jersey City, N.J.

Pleasure Boats, Canoes, Launches.

Send nickel for Illus. Catalogue.
J. H. RUSHTON,
CANTON, N. Y.

THE OBER LATHES

Patented.

For Turning Axe, Adze, Pick, Sledge, Hatchet, Hammer, Auger, File, Knife and Chisel Handles, Whiffletrees, Yokes, Spokes, Porch Spindles, Stair Balusters, Table and Chair Legs and other irregular work.
☞ *Send for Circular A.*
The Ober Lathe Co., Chagrin Falls, O., U. S. A.

NICKEL PLATED POCKET LEVELS

2½ inch, - - - - 0.40 | 3½ inch, - - - - 0.50
98 page Catalogue of Fine Tools, Free.
THE L. S. STARRETT CO. Box 13, Athol, MASS. U. S. A.

If You Want the Best Lathe and Drill CHUCKS

BUY WESTCOTT'S *Strongest Grip, Greatest Capacity and Durability, Cheap and Accurate.*

Westcott Chuck Co., Oneida, N. Y., U. S. A.
Ask for catalogue in English, French, Spanish or German.
FIRST PRIZE AT COLUMBIAN EXPOSITION, 1893.

THE COBURN PATENT TROLLEY TRACK
Barn Door Hangers

Impossible for door to jump the track.
Very simple and cheap to apply.
☞ *Send for Book.*
THE COBURN TROLLEY TRACK MFG. CO.,
HOLYOKE, MASS.

ROCK DRILLS
AIR COMPRESSORS
SIMPLEST, MOST EFFICIENT and DURABLE.
RAND DRILL CO.
Send for Catalogue. 100 Broadway, New York.

DO YOU USE GRINDSTONES?

If so, we can supply you. All sizes **mounted** and **unmounted,** always kept in stock. Remember, we make a specialty of selecting stones for all special purposes. ☞ *Ask for catalogue*
The CLEVELAND STONE CO.
2d Floor, Wilshire, Cleveland, O.

Band Saw Machines

"TO BEAT THE BAND."
Belt Power and Foot Power.
Our Machines have Modern Improvements. Made in several sizes. Circulars and prices on application. CRESCENT MACHINE CO., No. 5 Front Street, Leetonia, Ohio.

HARRINGTON & KING PERFORATING CO.

225 NORTH UNION ST. CHICAGO, ILL. U.S.A.

RISDON IRON WORKS SAN FRANCISCO CAL.

River Gold Dredger
THE MOST PERFECT YET INVENTED.
Money Made Quick and Fast. **Handles all material at a cost of but 3 to 5 cents cubic yard.** Adapted to all situations. Contract to erect and start in successful operation.
RISDON IRON WORKS, 200 Beale St., San Francisco, Cal.
☞ *Send for Pamphlet*
BUILDERS OF
Mining and Marine Machinery, Irrigation and Water Works Plants, Boilers and Engines.

GAS AND GASOLINE ENGINES
WATER MOTORS
BACKUS WATER MOTOR CO. NEWARK N.J. U.S.A.

THE Scientific American ARMY AND COAST DEFENCE SUPPLEMENT.

10-INCH GUN ON DISAPPEARING GUN CARRIAGE.

GUNS, ARMOR AND FORTIFICATIONS.

In response to numerous requests for detailed information regarding our Coast Defences, we have just published a special edition of the SCIENTIFIC AMERICAN SUPPLEMENT under the above title as complementary to our recent "Navy" issue. It is similar in size, quality and general make-up to the Navy Supplement, and in it will be found the most important facts regarding our system of coast defence and the varied character of the "war material" upon which it depends.

Among the subjects treated are the following:

- **8, 10, 12 and 13 inch guns.**
- **Disappearing gun carriages as used in coast defences.**
- **Rapid-fire guns, various types.**
- **Machine guns, such as Hotchkiss, Gatling, Colt, Maxim.**
- **Armor; method of manufacture, tests, etc.**
- **Projectiles, powders and guncotton; process of manufacture.**
- **Range finders, submarine mines, etc.**
- **Tables of size, power, penetration, etc., of the various guns.**
- **Mortars, dynamite guns, submarine mines, small arms.**
- **Diagrams showing flight of modern projectiles and penetrating power.**
- **Mountain guns and method of transportation by mule pack.**

This issue opens with a brief discussion of the exact and proper scope of a system of coast defence, in which it is shown that both army and navy are intimately associated in its planning and execution.

The descriptive matter commences with an account of the 12-inch coast defence guns and the methods of their construction, mounting and operation. Then in their order follow a series of chapters on heavy rapid-fire guns, light rapid-fire guns and machine guns, in which the leading types of each class are fully illustrated and described. The development of armor is described from the early wrought iron plate down to the re-forged face-hardened Harvey plate of to-day. Under the head of powders is an article on the manufacture of guncotton, and following this is a brief account of the much-talked-of smokeless powders. Dynamite guns are illustrated in several handsome cuts.

There is a very full chapter on the subject of harbor defence, including diagrams of the various systems of range-finders and the modern methods of defence by mortar-fire, submarine mines and dirigible torpedoes. Under the last head, the Whitehead, Howell, and Sims-Edison types of torpedo are shown in a series of cuts which will be entirely new to the public. A chapter on the small arms carried by the army, navy and volunteers is followed by tables of statistics of the guns in use in our own service and those of leading foreign powers.

The illustrations number over 100 and include a **magnificent double page supplement of our largest battleship, the "Iowa."**

The colored cover shows an illustration of a large coast defence gun in action.

PRICE, BY MAIL, 25 CENTS.

MUNN & CO., Publishers,
361 Broadway, New York City.

© 1898 SCIENTIFIC AMERICAN, INC.